ir33

User manual

Preliminary version

LEGGI E CONSERVA QUESTE ISTRUZIONI

READ AND SAVE THESE INSTRUCTIONS

CAREL

Tecnologia ed Evoluzione

We want to save you time and money!
We can assure you that the thorough reading of this manual will guarantee correct installation and safe use of the product described.

IMPORTANT WARNINGS

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Before installing or handling the appliance please carefully read and follow the instructions described in this manual.

This instrument has been designed to operate without risks for the specific purpose, only if:
installation, operation and maintenance are performed according to the instructions in this manual;
the environmental conditions and supply voltage fall within the values indicated here below.

Any different use or changes that have not been previously authorised by the manufacturer, are considered improper.

Responsibility for injures or damage caused by improper use will lie exclusively with the user.
Warning: voltage is present in some electrical components of this unit, thus all the service or maintenance operations must be performed by expert and skilled personnel only, aware of the necessary precautions to be taken.

Before accessing the internal parts, disconnect the power supply.
Disposal of controller parts:

The controller is made up of metal and plastic parts and a lithium battery. All these components must be disposed of according to the local legislation in force.

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1. Introduction

The ir33 series for refrigeration is a complete range of products made up of integrated electronic microprocessor controllers with LED display, designed especially for the control of stand-alone refrigeration units: These controllers are especially suitable in applications that require high load switching power, a considerable number of outputs, functions and control with direct access from the keypad, high front panel IP and. at the same time. a compact shape that significantly reduces the overall dimensions.
The irr33 range is easy to install and ensures optimisation of production times for the manufacturer in mass production.
Numerous models are available, providing the best solution for each application at the most competitive price.

1.1 Models available

The controllers are available in the configuration with 1, 2, 3 and 4 outputs, many of which have a 16 A relay for the refrigerator compressor and a power feeder with extended switching range (12…24 or 115…230 Vac). The numerous versions ensure considerable flexibility and consequently the possibility to use the controllers in many different applications, without the need to radically change the systems and designs.

1.2 Features of the irr 33 range

Alimentazione

The ir33 series models are available with power supply in the following versions: 12Vac, 12…24 Vac/dc (switching), 230Vac or 115…230 Vac (switching).
All the models, furthermore, feature a low power mode to increase immunity to voltage drops.
When the voltage inside the instrument falls below a certain threshold, the unit switches off the display so as to reduce power consumption, while still continuing to operate normally: the main relays remain energised and, as soon as the voltage returns to the normal level, the display comes on again.

Aesthetics and ergonomics

The appearance of the ir33 series has been designed to harmoniously match the new lines of the refrigeration units.
It most striking aesthetic feature is its compactness: its dimensions are: 34.4x76.2x70.5 mm and 34.4x76.2x56.5mm in the 230 Vac version. The drilling templates for both versions are 71x29 mm.

LED display

ir33 is fitted with a very powerful and aesthetically pleasant display, with 3 digits and decimal point, minus sign and icons to simplify the reading of values and operating statuses.

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Alarm buzzer

All models in the ir33 series are fitted with a buzzer to signal the alarms.

Remote control

To simplify the setting and display of the parameters, depending on the model, the instrument can be fitted with an infrared receiver to allow the use of the new compact remote control: this device can be used on a series of ir33 controllers in the same room, without problems of interference. In fact, each controller is identified by a different access code.

Duty setting

This function ensures the operation of the compressor even when the control probe (room probe) is faulty.
If the probe is disconnected or short-circuited, the compressor is activated at set intervals, with a running time (in minutes) equal to the value assigned to the **duty setting** parameter (parameter C4), and a fixed OFF time of 15 minutes.

Smart defrost

All ir33 series controllers can, as standard, manage the defrost functions in new modes (see the paragraph on smart defrosts).

Multifunction input

All the ir33 series instruments have two digital inputs that can be used in different modes, depending on the value set for the "digital input configuration" parameters (parameters A4 and A5). These inputs can be used to enable/disable the defrost, to manage serious alarms that require the immediate shut-down of the unit (e.g. high pressure) or delayed shut-down of the unit (e.g. low pressure), or alternatively can be configured to read NTC probes.

Multifunction output

According to model, the ir33 family can be provided with an additional multi-function output for remote control of the alarm signal for controlling additional units through ON/OFF activation.

Rtc
The wide range also includes models fitted with built-in real time clock.

Pump down
This function ensures the compressor is stopped only when the evaporator is discharged (see the paragraph “Pump down and low pressure").

Condenser
One of the new characteristics offered by these controllers is the possibility to manage, via an NTC probe input, the condensing temperature for both the alarms and control functions, using the auxiliary output configured by parameter H1.

Double evaporator
Two independent evaporators can be managed, connected to the same circuit. The end of defrost temperatures are independent and can be set by parameters dt1/dt2.

HACCP
This function, increasingly required in the refrigeration market, is included as standard on all models with clock.
This allows the monitoring of critical points by measuring and recording the temperatures in the event of high temperature alarms or power failures.

Management of the light
The ir33 range has been enhanced by the introduction of the function for managing the light when the door opens.

Keypad protection
The keypad and the remote control can be disabled to avoid tampering by unauthorised persons, above all in the event when the controller is installed in an area open to the public.

Continuous cycle
The “continuous cycle” function ensures the operation of the compressor for the time set by the corresponding parameter.
This function is useful when a rapid reduction in the temperature is required.

Serial connection
The entire range of ir33 models has an RS485 serial port for connection to supervisor or telemaintenance systems using a two wire plus shielded cable across a serial network.

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Index of protection
In the ir33 series, the gasket inside the front panel and the material used to build the keypad guarantee IP65 protection class for the control on the front panel.

Installation
The ir33 series controllers are mounted using the screws at the front, or alternatively using two quick-fit side brackets, with compact dimensions, made from plastic.

In-circuit testing
The ir33 series controllers are made using the most advanced SMD technology. All the controllers undergo “IN-CIRCUIT TESTING” to check electrical operation of all components. The tests are performed on 100% of the products.

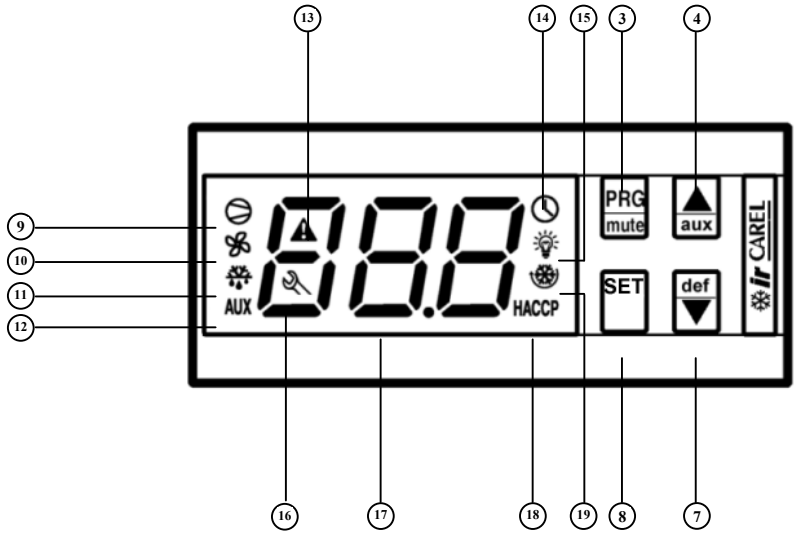
NTC probe
The ir33 series can manage two types of NTC probes (see parameter “/P”): standard version –50T90°C (NTC0*HP*) or alternatively the model for high temperatures, up to 150°C (enhanced NTC –40T150°C).

Watch dog
This feature prevents the microprocessor from losing control over the unit even in the presence of considerable electromagnetic disturbance. In the event of abnormal operation, the watchdog function re-establishes the initial operating status. Not all the competitors fit their products with this safety feature.

Electromagnetic compatibility
The ir33 series is compliant with EU standards on electromagnetic compatibility. The quality and the safety of the ir33 series are ensured by the CAREL ISO 9001 certified design and production system and by the CE mark on the product.

2. User interface

The ir33 user interface consists of a very powerful and attractive display and a keypad.
The display has 3 digits, decimal point and icons. It shows temperatures, codes, all parameter values, and the main unit statuses.
The silicon keypad ensures ease of use and reliability, and allows direct access to the HACCP, light, defrost and continuous cycle functions.
The display can be customised simply and economically by changing the removable frame.



2.1 Display and icons

⑨ **COMPRESSOR:** ON when the compressor starts. Flashes when the activation of the compressor is delayed by safety times.

⑩ **FAN:** ON when the fan starts. Flashes when the activation of the fan is prevented due to external disabling or procedures in progress.

⑪ **DEFROST:** ON when the defrost is activated. Flashes when the activation of the defrost is prevented due to external disabling or procedures in progress.

⑫ **AUX:** ON when the auxiliary output (1 and/or 2) selected as AUX is activated.

⑬ **ALARM:** ON following pre-activation of the delayed external digital input alarm. Flashes in the event of alarms during normal operation (e.g. high/low temperature) or in the event of alarms from an immediate or delayed external digital input.

⑭ **CLOCK:** ON if at least one timed defrost has been set. At start-up, comes ON for a few seconds to indicate that the Real Time Clock is present.

⑮ **LIGHT:** ON when auxiliary output 1 selected as LIGHT is activated.

⑯ **SERVICE:** Flashes in the event of malfunctions, for example E^2PROM errors or probe faults.

⑰ **DISPLAY:** shows temperature in range -50 and +150°C with tenths resolution in range -19.9 and 19.9°C.
Display of tenths can be disabled by programming a parameter.

⑱ **HACCP:** ON if the HACCP function is enabled. Flashes when there are new HACCP alarms stored (HA and/or HF alarm shown on the display).

⑲ **CONTINUOUS CYCLE:** ON when the CONTINUOUS CYCLE function is activated. Flashes if the activation of the function is prevented due to external disabling or procedures in progress (e.g.: minimum compressor OFF time).

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ICON	FUNCTION	Normal operation			Start up
		ON	OFF	FLASHING	
	COMPRESSOR	Compressor ON	Compressor OFF	Compressor request	
	FAN	Fan ON	Fan OFF	Fan request	
	DEFROST	Defrost active	Defrost not active	Defrost request	
AUX	AUX	AUX auxiliary output active	AUX auxiliary output not active		
	ALARM	Delayed external alarm (before the expiry of the time A7)	No alarm present	Alarms in norm. operation (e.g. High/low temperature) or alarm from external digital input, immediate or delayed	
	CLOCK	If at least 1 timed defrost has been set	No timed defrost has been set		ON if Real time clock present
	LIGHT	LIGHT auxiliary output ON	LIGHT auxiliary output OFF		
	SERVICE		No malfunction	Malfunction (e.g. E^2PROM error or probe fault). Request service	
HACCP	HACCP	HACCP function enabled	HACCP function not enabled	HACCP alarm saved (HA and/or HF)	
	CONTINUOUS CYCLE	CONTINUOUS CYCLE function activated	CONTINUOUS CYCLE function not activated	CONTINUOUS CYCLE function request	

2.2 Keypad

① PRG/MUTE:

- Mutes the audible alarm (buzzer) and deactivates the alarm relay;
- If pressed for more than 1 second during the reception of the automatic network address assignment request package, starts the address assignment procedure (see paragraph *Automatic serial address assignment procedure*);
- If pressed for more than 5 seconds, accesses the menu for setting the type "F" parameters (frequent);
- If pressed for more than 5 seconds together with SET, accesses the menu for setting the type "C" parameters (configuration);
- If pressed for more than 5 seconds when switching the instrument ON, activates the procedure for setting the default parameter values.
- If pressed for more than 5 seconds together with aux, resets any active alarms with manual reset (the message rES indicates that the alarm has been reset); any delays relating to the alarms are re-activated.

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② SET:

- If pressed for more than 1 second displays and/or enables setting the set point;
- If pressed for more than 5 seconds together with PRG mute, accesses the menu for setting the type "C" parameters (configuration).
- Pressing this button for more than 1 second together with key def displays a sub-menu used to reach the parameters relating to the HACCP alarms (HA, HAn, HF, and HFn).
- If pressed for more than 5 seconds together with key aux, it starts the report printing procedure (if the controller is connected to the printer interface).

③ UP/AUX:

- If pressed for more than 1 second, it activates/deactivates auxiliary output 1.
- If pressed together with def for more than 5 seconds, activates/deactivates continuous cycle operation (the messages 'ccb' and 'ccE' indicate, respectively, the continuous cycle start and end request).
- If pressed for more than 5 seconds together with key SET, it starts the report printing procedure (if the controller is connected to the printer interface).
- If pressed for more than 5 seconds together with PRG mute, resets any active alarms with manual reset (the message rES indicates that the alarm has been reset); any delays relating to the alarms are re-activated.

④ **DOWN/DEF:**

- If pressed for more than 5 seconds, it activates/deactivates a manual defrost (the messages dFb and dFE indicate, respectively, the defrost start and end request);
- If pressed together with AUX for more than 5 seconds, activates/deactivates continuous cycle operation (the messages ccb and ccE indicate, respectively, the continuous cycle start and end request).
- Pressing this button for more than 1 second together with key SET displays a sub-menu used to reach the parameters relating to the HACCP alarms (HA, HAn, HF, and HFn).

Important: when the buttons are pressed a brief audible signal is emitted; this signal cannot be disabled.

Icon	Button	Normal operation		Start up	Automatic address assignment request
		Pressing the button alone	**Pressing together with other buttons**		
PRG mute	PRG/MUTE	If pressed for more than 5 seconds, accesses the menu for setting the **type "F" parameters (frequent).** **Mutes the audible alarm (buzzer) and deactivates the alarm relay**	**SET:** If pressed for more than 5 seconds together with **SET**, accesses the menu for setting the **type "C" parameters (configuration).** **UP/AUX:** If pressed for more than 5 seconds together with UP/CC **resets any active alarms with manual reset.**	If pressed for more than 5 seconds on start-up, it activates the .RESET procedure	If pressed for more than 1 second **enters the automatic address assignment procedure.**
AUX	UP/AUX	If pressed for more than 1 second, it activates/deactivates the **auxiliary output.**	**DOWN/DEF:** If pressed for more than 5 seconds, together with key **DOWN/DEF**, it activates/deactivates continuous cycle operation. **SET:** If pressed for more than 5 seconds together with the **SET** key , it starts the report printing procedure (if the controller is connected to the printer interface). **PRG/MUTE:** If pressed for more than 5 seconds together with PRG/MUTE key, it **resets any active alarms with manual reset.**		
def	DOWN/DEF	If pressed for more than 5 seconds, it activates a **manual defrost.**	**UP/AUX:** If pressed for more than 5 seconds, together with key **UP/AUX**, it activates/deactivates **continuous cycle** operation. **SET:** Pressing this button for more than 1 second together with the **SET** key, it displays a sub-menu used to reach the parameters relating to the **HACCP alarms (HA, HAn, HF, and HFn).**		
SET	SET	If pressed for more than 1 second displays and/or enables setting the **Set point**;	**PRG/MUTE:** If pressed for more than 5 seconds together with PRG/MUTE, accesses the menu for setting the **type "C" parameters (configuration).** **DOWN/DEF:** Pressing this button for more than 1 second together with key **DOWN/DEF** it displays a sub-menu used to reach the parameters relating to the **HACCP alarms (HA, HAn, HF, and HFn).** **UP/AUX:** If pressed for more than 5 seconds together with key **UP/AUX**, it starts the report printing procedure (if the controller is connected to the printer interface).		

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2.3 Procedure for displaying and deleting the HACCP alarms

1) If you press keys def and SET for more than one second, the display will show the name of the first of the parameters of the HA and HF alarms.
2) Scroll the menu with the aux and def keys; the display shows the names of the various parameters relating to the HA and HF alarms;
3) When you have reached the desired parameter press SET to display the value;
4) If the selected parameter is 'HA' or 'HF', use keys aux and def to scroll the year, month, day, hour, minutes and duration of the last 'HA' or 'HF' alarm that was activated.

   e.g.:
   y03 def M07 def d22 def h23 def m57 def t99 def, and restart…

5) The sequence indicates that the last 'HA' or 'HF' alarm was activated on 22 July 2003 at 23:57 and lasted 99 hours.
6) Press SET again to return to the list of the parameters relating to the HA and HF alarms;
7) The following operations are possible from inside the menu:
   a) delete the HACCP alarm by pressing def and SET key for more than 5 seconds (the message 'rES' indicates that the alarm has been deleted, the flashing of the HACCP LED is reset, the HA and/or HF signal is also reset, and the monitoring of HA is reinitialised);
   b) delete the HACCP alarms and the saved alarms (HAn, HA, HA1, HA2, HFn, HF, HF1, HF2) by pressing def and SET for more than 5 seconds (the message 'rES' indicates that the alarms have been deleted, the HACCP LED stops flashing, the HA and/or HF signal is reset, the alarms saved HAn, HA, HA1, HA2, HFn, HF, HF1, HF2 are reset and the monitoring of HA is reinitialised)
8) Normal operation can be resumed at any time by pressing PRG mute for 3 seconds or waiting for the expiry of the session due to TIMEOUT (60 seconds) without pressing any key.

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2.4 AUX key

Key aux is always assigned to auxiliary logic output 1.

Furthermore, different functions can be assigned to auxiliary logic function 1 (H1). The default setting of auxiliary output 1 is associated with the AUX function.
According to the assigned function, the corresponding icon is activated on the display.

Physical output	Key	Function	Icon
auxiliary 1	AUX	AUX (default)	AUX

Consequently, a situation could arise, where by assigning different functions, pressing the aux key switches on the lamp icon.

Logical output	Key	Function	Icon
auxiliary 1	AUX	LIGHT	LAMP

Available functions:
H1=0 Alarm output: normally energised. The relay is de-energised when an alarm occurs;
H1=0 Alarm output: normally de-energised. The relay is energised when an alarm occurs
H1=2 Auxiliary output;
H1=3 Light output;
H1=4 Auxiliary evaporator defrost output:
H1=5 Pump-Down valve output:
H1=6 Condenser fan output:
H1=7 Delayed compressor output;
H1=8 Auxiliary output, with deactivation set to OFF;
H1=9 Auxiliary output, with deactivation set to OFF;
H1=10 No function associated with the output.

3. Installation

To install the controller, proceed as follows, with reference to the connection diagrams shown at the end of the manual.

1) **connect the probes and power supply:** the probes can be installed up to a maximum distance of 10m from the controller, using cables with a minimum cross-section of 1mm², shielded where possible. To improve the immunity to disturbance, use probes with shielded cables (connect only one end of the shield to the earth on the electrical panel).
2) **Program the instrument:** for a more detailed description see the chapter "Programming the instruments".
3) **Connect the actuators:** the actuators should only be connected after having programmed the controller. In this connection, carefully check the maximum capacities of the relays, indicated in the "technical specifications".
4) **Serial network connection:** all ir33 models are fitted with a serial connector for connection to the supervisory network via the serial interface code IROPZ48500. Take care when earthing the system, in particular the secondary winding of the transformers that supply the instruments must not be earthed. If connection to a transformer with earthed secondary winding is required, an insulating transformer must be installed in between. A series of instruments can be connected to the same insulating transformer, nevertheless you are recommended to use a separate insulating transformer for each instrument.

WARNINGS:

Avoid installing the instrument in environments with the following characteristics:
- relative humidity over 90% non-condensing;
- heavy vibrations or knocks;
- exposure to continuous jets of water;
- exposure to aggressive and polluting atmospheric agents (e.g.: sulphur and ammonia gases, saline mist, smoke) which may cause corrosion and/or oxidation;
- high magnetic and/or radio frequency interference (e.g. near transmitting antennas);
- exposure to direct sunlight and atmospheric agents in general; large and rapid fluctuations in ambient temperature;

The following warnings must be observed when connecting the controllers:
- Incorrect connection of the power supply may seriously damage the system.
- Use cable ends that are suitable for the terminals. Loosen every screw and fit the cable end, next tighten the screws and gently pull the cables to check their tightness. When tightening the screws, do not use automatic screwdrivers, or adjust the screws to a tightening torque less than 50 Ncm.
- Separate as much as possible (by at least 3 cm) the probe signal and digital input cables from inductive loads and power cables, to avoid any electromagnetic disturbance.
  Never lay power cables and probe cables in the same cable conduits (including those for the electrical panels).
  Do not install the probe cables in the immediate vicinity of power devices (contactors, circuit breakers or the like).

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Reduce the length of the sensor cables as much as possible, and avoid spirals around power devices.
- Only use IP67 guaranteed probes as end defrost probes; place the probes with the vertical bulb upwards, so as to facilitate drainage of any condensate.

Remember that the thermistor temperature probes (NTC) have no polarity, so the order of connection of the ends is not important.

CLEANING THE INSTRUMENT.
When cleaning the instrument do not use ethanol, hydrocarbons (petrol), ammonia and by-products. Use neutral detergents and water.

4. Programming the instruments

The parameters can be modified using the front keypad.
The operating parameters are divided into two families: frequent use parameters (type "F") and configuration parameters (type "C").
Access to the configuration parameters is protected by a password that prevents unwanted modifications or access by unauthorised persons.

4.1 How to access type "F" parameters

Press PRG mute for more than 5 seconds (if an alarm is active, the buzzer is muted first of all), the display shows the code of the first modifiable type "F" parameter.

4.2 How to access type "C" parameters

1) Press PRG mute and SET together for more than 5 seconds; the display will show the number "00";
2) Press aux or def until displaying the number "22" (the code of the password allows access to the parameters);
3) Confirm by pressing SET;
4) The display shows the code of the first modifiable type "C" parameter.

4.3 Modifying parameters

After having displayed the parameter, either type "C" or type "F", proceed as follows (Fig. 1 and 2):

1) Press aux or def until reaching the parameter to be modified, when scrolling, an icon appears on the display representing the category the parameter belongs to;
2) Alternatively, press PRG mute to display a menu that is used to quickly access the "group" of parameters to be modified;
3) Scroll the menu with the aux and def buttons; the display shows the codes of the various categories of parameters (*see the "Summary of operating parameters"*), accompanied by the display of the corresponding icon (if present);
4) When you have reached the desired category, press SET to move directly to the first parameter in the category (if there are no visible parameters in the selected category, pressing SET will have no effect);
5) At this point, continue to scroll the parameters until you reach the parameter to be modified, or return to the "Categories" menu by pressing PRG mute for one second.
6) Press SET to display the associated value;
7) Increase or decrease the value with the aux or def keys respectively, until you reach the desired value;
8) Press SET to *temporarily* save the new value and return to the display of the parameter code;
9) Repeat the operations from point 1 or point 2;
10) If the parameter has sub-parameters, press SET to display the first sub-parameter;
11) Press aux or def to display all the sub-parameters;
12) Press SET to display the associated value;
13) Increase or decrease the value with the aux or def keys respectively, until you reach the desired value;
14) Press SET to temporarily save the new value and return to the display of the sub-parameter code;
15) Press PRG mute to return to the display of the parent parameter.

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4.4 Parameter classification

The parameters, as well as being divided by TYPE, are also grouped into logical categories identified by the initial letters or symbols of such parameters. The following table lists the categories and the corresponding letters.

Parameters	Category	Text	Icon
/	Temperature probe management parameters	Pro	
r	Temperature control parameters	CtL	
c	Compressor safety time and activation parameters	CMP	
d	Defrost management parameters	dEF	
A	Alarm management parameters	ALM	
F	Fan management parameters	Fan.	
H configuration	General configuration parameters (addresses, enabling, etc.…)	CnF	AUX
H HACCP	HACCP parameters	HcP	HACCP
RTC	RTC parameters	rtc	

4.5 Storing new values assigned to parameters

1) To definitively store the new values of the modified parameters, press PRG mute for more than 5 seconds, to exit the parameter setting procedure.

All the modifications made to the parameters, temporarily stored in the RAM, can be cancelled and "normal operation" resumed by not pressing any button for 60 seconds, thus allowing the parameter setting session to expire due to timeout.

Important: if the programming session ends by timeout, the clock parameters will not be reset, as these parameters are saved immediately when entered.

If the instrument is switched off before pressing PRG mute, all the modifications made to the parameters and temporarily saved will be lost.

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4.6 Setting the set point

To display or set the set point, proceed as follows:

1) Press SET for more than 1 second to display the set point;
2) Increase or decrease the set point using the ▲ aux and def ▼ buttons respectively, until reaching the desired value;
3) Press SET again to confirm the new value.

4.7 Alarms with manual reset

The alarms with manual reset can be reset by pressing PRG mute and ▲ aux together for more than 5 seconds.

4.8 Procedure for setting the default parameter values

To set the default parameter values for the controller, proceed as follows:

1) Switch the instrument off;
2) Press the PRG mute key;
3) Switch the instrument on again, holding the PRG mute button until the message "_std_" is shown on the display;

Note: the default values are set only for the visible parameters (e.g. C or F), according to models - see the "Operating parameters" table.

4.9 Serial address automatic assignment

The automatic setting of the serial address is a special procedure that, by using an application installed on a PC connected to the CAREL network, to set and manage in a simple way the addresses of all the instruments (including this feature) connected to the CAREL network.

The procedure is very simple:

1) Using the remote application, start the "Network definition" procedure; the application begins to send a special message ('<!ADR>') across the network, containing the network address;
2) Pressing the PRG mute button on the keypad of the instrument connected to the network, the instrument recognises the message sent by the remote application, automatically setting the address to the required value and sending a confirmation message to the application, containing the unit code and firmware revision (message 'V');
   When the message sent by the remote application is recognised, the instrument displays the message 'Add' for 1 second, followed by the value of the assigned serial address.
3) The application, on receiving the confirmation message from the units connected to the network, saves the information received in its database, increases the serial address and resumes sending the message '<!ADR>';
4) At this point, the procedure starting from point 2 can be repeated on another unit connected to the network, until all network addresses are defined.

Note: When the operation for assigning an address to an instrument has finished, for reasons of safety, the operation is inhibited for 1 minute on that instrument. Consequently, a different address cannot be re-assigned to the instrument during that time.

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5. Accessories

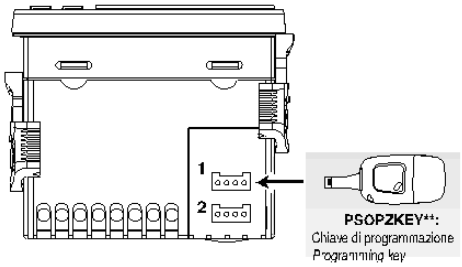
5.1 Parameter copying key

Programming keys **PSOPZKEY00** (Figure No 1) and **PSOPZKEYA0** (Figure No. 2) for CAREL controllers are used to copy the complete set of parameters of the CAREL ir33 controller parameters. The keys must be connected to the connector (4 pin AMP) fitted on the compatible controllers, and work even without switching the controller on, as indicated in the operating instructions for the controller (see the summary diagram in Figure 3).

IMPORTANT: PJOPZKEY00 to be used ONLY for PJ controllers;
PSOPZKEY to be used ONLY for powercompact/ir33, MasterCella, Power-split, MGE and I/O module.**

(Figure No. 1)

(Figure No. 2)



(Figure No. 3)

Three functions are available, and are selected by using the two supplied dipswitches; these can be accessed by removing the battery cover:

- **Load** the parameters into the parameter key of a controller (UPLOAD);
- **Copy** from the key to a controller (DOWNLOAD);
- **Extended copy** from the key to a controller (EXTENDED DOWNLOAD).

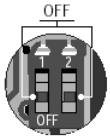
Warning: The parameters can only be copied between instruments with the same code. The UPLOAD operation can, however, always be performed. As specifically concerns ir33 controllers, the following procedure is used to copy and download the parameters:

5.1.1 Copying and downloading the parameters

The following operations are used for the UPLOAD and/or DOWNLOAD or EXTENDED DOWNLOAD functions, simply by changing the settings of the dipswitches to change the function:

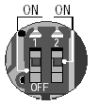
preliminary version

UPLOAD:



DOWNLOAD:

EXTENDED DOWNLOAD:



- open the rear cover on the key and position the 2 dipswitches according to the desired operation;
- close the rear cover on the key and insert the key in the connector of the controller;
- press the button and check the LED: red for a few seconds, then green, indicates that the operation was completed correctly. Other signals or the flashing of the LED indicates that problems have occurred: refer to the relevant table below;
- at the end of the operation, release the button, after a few seconds the LED goes OFF;
- remove the key from the controller;

LED signal	Error	Meaning and solution
Red LED flashing	Batteries discharged at start copy	The batteries are discharged, the copy operation cannot be performed. Replace the batteries.
Green LED flashing	Batteries discharged during copy or at end of copy	During the copy operation or at the end of the operation the battery level is low. Replace the batteries and repeat the operation.
Red/green LED flashing	Instrument not compatible	The parameter set-up cannot be copied as the connected controller model is not compatible. This error only occurs for the DOWNLOAD function; check the code of the controller and run the copy only for compatible codes.
Red and green LEDs ON	Error in Data being copied	Error in the data being copied. The instrument's EEPROM is corrupted, and, therefore ,the key cannot be copied.
Red LED on steady	Data transfer error	The copy operation was not completed due to a serious error when transferring or copying the data. Repeat the operation, if the problem persists check the key connections.
LED OFF	Batteries disconnected	Check batteries.

Notes:

1 At the start and the end of the UPLOAD and DOWNLOAD operations (normal or extended), the buzzer on the instrument will emit an audible signal.

2 The DOWNLOAD operation (normal or extended) is possible even if the operating parameters and controller are incorrect. If there is an error in the unit parameters, these will be recovered by the key. Be careful when recovering the unit parameters from a key, as these determine the low-level operation of the controller (unit model, type of interface, assignment of logical relay to physical relay, brightness of the display, level of modulation of the relay control signal …). **The unit parameters from the original model must therefore be restored to ensure the correct operation of the controller.**

5.2 Compact remote control

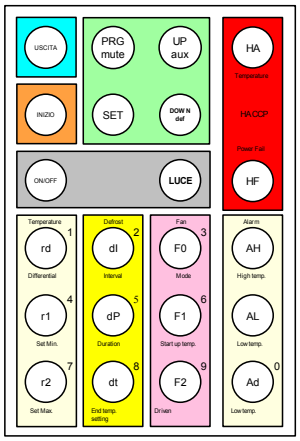
The COMPACT remote control features 20 buttons and allows direct access to the following parameters:

- Temperature;
- Defrost;
- Fans;
- Alarms;
- HACCP.

The following functions can also be controlled:

- Start defrost;
- Aux;
- Light;
- ON/OFF;
- Mute.

The standard remote control features the four buttons, PRG/mute, SET, UP and DOWN, which access almost all the functions provided by the instrument keypad.



The keys can be divided into three groups, based on their functions:

- Keys for enabling and disabling the use of the remote control;
- Keys for remote simulation of the instrument keypad;
- Keys for direct display of the most commonly used parameters.

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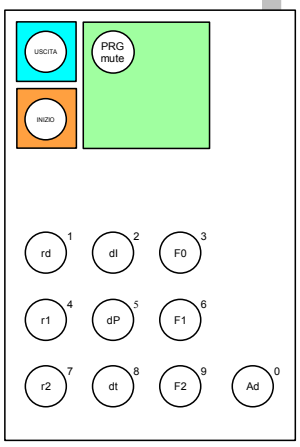
Activating and deactivating programming from the remote control**.**



Key	Immediate function	Delayed function
START	used to enable the remote control; each instrument displays its own enabling code	
EXIT	ends operation using the remote control, cancelling all changes made to the parameters	
PRG	used to display the configuration parameters	pressing and holding for 5s ends use of the remote control, saving the modified parameters.
NUMBERS	used to select the instrument, by entering the enabling code displayed.	

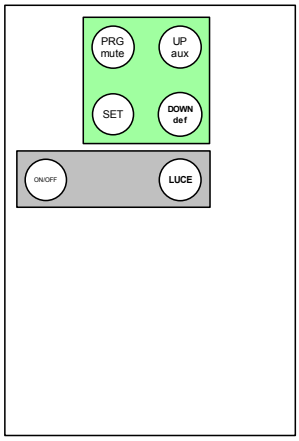
By pressing the START button, each instrument displays its own remote control enabling code (H3).
The NUMERIC keypad is used to enter the enabling code of the instrument in question. At the end of this operation, only the instrument with the selected enabling code will be programmed from the remote control, all the others will resume normal operation.

Assigning different enabling codes to the instruments, allows, in this phase, only the desired instrument to be programmed using the remote control, without the risk of interference.

The instrument enabled for programming from the remote control will display the reading and the rCt message. This status is called **Level 0**.

When you have entered the remote control programming mode:
if you press PRG for 5 seconds, this enables you to exit remote control programming, saving the modifications
press EXIT to exit remote control programming, without saving modifications.

Remote simulation of the instrument keypad



The highlighted part is used to simulate the instrument keypad from the remote control.
In **Level 0** (display the reading and rCt message), the following functions are active:

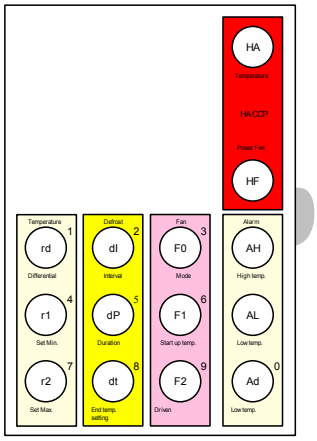
Key	Function
def	Start and stop defrosting
aux	Activation and deactivation of auxiliary relay 1
light	Activation and deactivation of auxiliary relay 2
ON/OFF	Instrument ON/OFF
PRG/mute	Mute the buzzer, if ON, and deactivate the alarm relay

In **Level 0,** the SET and PRG/mute buttons are also active; these are used to set the Set point (**Level 1)** and the configuration parameters (**Level 2).**

Key	Immediate function	Delayed function
PRG/mute	used to access modification of parameter configuration mode	pressing and holding for 5s ends use of the remote control, saving the modified parameters.
SET	used to access Set point modification	

In Levels 1 and Level 2, the PRG/mute, SET, UP and DOWN keys repeat the corresponding functions on the instrument keypad. In this way, all the instrument parameters can be displayed and modified, even those without shortcut keys.

Keys for direct display of the most commonly used parameters



Some parameters, relating to:

- Temperature;
- Defrost;
- Alarms;
- Fans;
- HACCP

are directly accessible using specific keys

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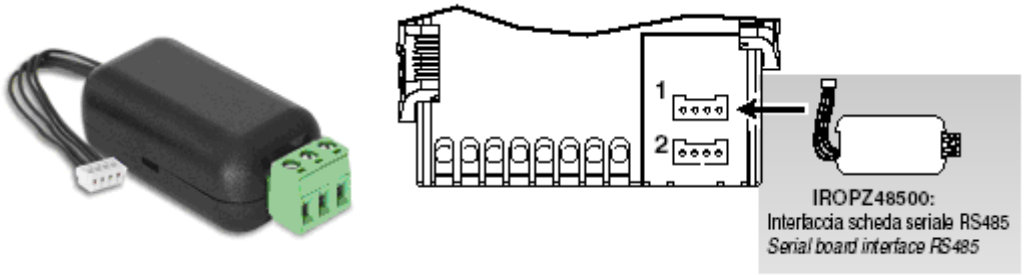
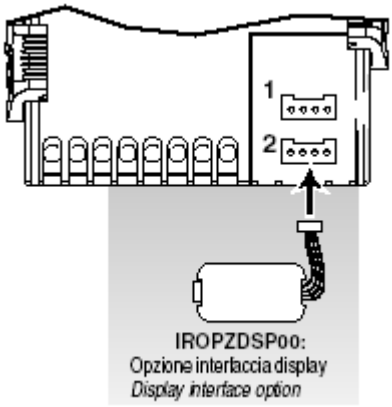
5.3 RS485 serial interface board

The RS485 serial card option (IROPZ48500), shown in the figure below, allows connecting the **ir33** instrument to the RS485 serial network for supervision of the measured values and modification of the internal operating parameters.
The connection diagram between the interface and the instrument is shown below. For further details, refer to the instruction sheet enclosed in the packaging of the interface option.



5.4 Repeater display interface option

The repeater display interface option (IROPZDSP00), shown in the figure below, allows the **ir33** to interface with a repeater display (IR00RG0000) to show the temperature measured by the third probe.
The connections lay-out between interface and instrument is shown below. However, for more details, consult the instructions contained in the packing of the optional interface.



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6. Description of the software functions

6.1 Models

The following is a summary of the functions relating to the various controller models.

Model S: static units with defrost by stopping the compressor

- Direct and Reverse-cycle compressor control;
- defrost by stopping the compressor by either time or temperature;
- continuous cycle;
- temperature alarm monitoring.

Model Y: static units with electric heater or hot gas defrost

- Direct and Reverse-cycle compressor control;
- electric heater or hot gas defrost, by time or by temperature;
- continuous cycle;
- temperature alarm monitoring.

Model F: ventilated units with electric heater or hot gas defrost (versions 115…230Vac)

- Direct and Reverse-cycle compressor control;
- electric heater or hot gas defrost, by time or by temperature;
- evaporator fan control;
- continuous cycle;
- temperature alarm monitoring.

Model C: model with 4 relays

- Direct and Reverse-cycle compressor control;
- electric heater or hot gas defrost, by time or by temperature;
- evaporator fan control;
- continuous cycle;
- temperature alarm monitoring;
- auxiliary output management.

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Functions enabled according to model:

Function	*S*	*Y*	*F*	*C*
compressor control	☒	☒	☒	☒
defrost by stopping the compressor	☒	☒	☒	☒
electric heater or hot gas defrost	☒	☒	☒	☒
continuous cycle	☒	☒	☒	☒
duty setting	☒	☒	☒	☒
evaporator fans	☒	☒	☒	☒
auxiliary output;				☒

The controllers can be fitted with a **maximum of one auxiliary relay**. The associated functions are:

- alarm output, normally open or closed;
- auxiliary output;
- light output;
- second evaporator output;
- control output for pump down valve;
- control output for condenser fans;
- second delayed compressor output,
- auxiliary output, with deactivation set to OFF;
- light output, with deactivation set to OFF;
- no function associated with the output.
- reverse output being controlled, with neutral zone.

The controllers can be fitted with a **maximum of two digital inputs** (or with three probe inputs). The associated functions are the following:

- immediate alarm;
- delayed alarm;
- enable defrost;
- start defrost;
- door switch with compressor and fan shutdown and light management;
- remote ON/OFF;
- curtain switch with Set Point variation and light management;
- low pressure alarm;

- door switch with fan shutdown and light management;
- Direct/Reverse selection;
- light sensor and light management.

The controllers can be fitted with a **maximum of four probes** (three of which as alternatives to the digital inputs). The following functions are associated with the probes:

- ambient probe (used to calculate the virtual control probe);
- product probe (if necessary, used for calculating the virtual control probe);
- defrost probe (main or secondary evaporator);
- condenser probe (used, if necessary, for condenser fans control).

Other functions that enhance the range of the refrigeration controllers include:

- Real Time Clock, for management of real time defrosts;
- Real Time Clock for HACCP alarms management;
- serial interface (optional) for connection to the CAREL Supervision System;
- interface (optional) for connection of a repeater display;
- facility for printing alarm reports.

6.2 Testing the display and keypad on start-up

When the controller is switched on, a special procedure tests the display and the keypad.

Phase	Display	Keypad	Note
First	Display completely OFF per 2 seconds	Press PRG for 2 seconds to set the default values	
Second	Display completely ON for 2 seconds	No effect	
Third	Three lines ('---') for 2 seconds	Pressing each button lights up a specific segment	In this phase, the clock appears and indicates the presence of the RTC.
Fourth	Normal operation	Normal operation	

6.3 Switching the controller ON and OFF

The unit can be switched ON/OFF from a number of sources: Supervisor and Digital input.
In this operating mode, the display will be show the temperature selected for parameter /tI, alternating with the OFF message .
The digital input has priority, and controls the ON/OFF status by level.
The other sources have lower priority, and act by status:

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Origin	Priority	Note	Action
Digital input	Priority 1 (higher)	ON/OFF disabled from Supervisor	According digital input level
Supervisor	Priority 3 (lower)		Variation in value from the supervisor

IMPORTANT: if there is more than one digital input selected as the ON/Off function (A4 and A5 = 6), the ON status will be activated when all the digital inputs are closed. If event one contact is open, the machine is changed over to OFF.

In OFF status, the following are disabled:

- compressor adjustment (pump down valve OFF and shut).
- defrost (cyclic and manual);
- fan adjustment;
- adjustment of fans at low relative humidity (if enabled);
- continuous cycle;
- adjustment of condensation fans (if enabled);
- the alarms listed below:
    - low temperature (LO, alarm reset, and monitoring initialised);
    - high temperature (HI, alarm reset, and monitoring initialised);
    - immediate alarm from external contact (IA, alarm reset and monitoring initialised);
    - delayed alarm from external contact (dA, alarm reset and monitoring initialised);
    - defrost finished due to timeout (Ed1 and Ed2, alarm reset);
    - Pump-Down alarm finished due to maximum time (Pd, alarm reset);
    - low pressure from external contact (LP, alarm reset and monitoring initialised);
    - autostart in Pump-Down (AtS, alarm reset and not displayed);
    - pre-alarm: condenser high temperature (cht, alarm reset, and monitoring initialised);
    - condenser high temperature alarm (Cht, alarm reset, and monitoring initialised);
    - alarm: door open for too long (door, alarm reset);
    - HA type HACCP alarm (alarm reset, and monitoring initialised);
    - HF type HACCP alarm (alarm reset, and monitoring initialised);

- buzzer (OFF) and alarm relay (non-alarm status);
- HACCP control;
- defrost requests generated according to programmed time bands;
- defrost requests generated according to compressor (if enabled) running time;
- defrost requests generated from digital input (if enabled);
- defrost requests generated from keypad and supervisor;
- defrost enabled from digital input (if enabled);
- Direct/Reverse from digital input (if enabled).

While the following are enabled:

- modification and display of frequent and configuration parameters and the Set Point;
- ON/OFF of auxiliary relay 1 (set as LIGHT or AUX);
- selection of the probe displayed (model M only);
- compressor autostart in Pump-Down (if enabled);
- door switch (with fan and compressor shutdown) limited to light management;
- remote ON/OFF;
- curtain switch, limited to light management;
- door switch (with fan shutdown only) limited to light management;
- management of the light sensor;
- updating of the defrost interval timer "dI";
- the alarms listed below:
  - control probe rE error;
  - probe 1 error (E0);
  - probe 2 error (E1);
  - probe 3 error (E2);
  - probe 4 error (E3);
  - probe 5 error (E4);
  - clock alarm (Etc);
  - e²prom alarm, unit parameters (EE);
  - e²prom alarm, operating parameters (EF);

Note: In the OFF status, **the defrost interval 'dI' is always updated,** to maintain the regularity of the interval. If a defrost interval expires during the OFF status, this event is saved and, when controller is switched back ON, a defrost request is generated.

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The controller **switches from ON to OFF** with the following sequence:

- compressor protection times are observed;
- the Pump-Down procedure is performed (if enabled);
- the defrost is forced OFF and will not resume when switched back ON;
- the continuous cycle is forced OFF and will not resume when switched back to ON.

The controller **switches from OFF to ON** with the following sequence:

- compressor protection times are observed;
- the defrost on start-up (if enabled) is not performed, as this in fact refers to power-up;
- the compressor and fan delays on start-up are not set.

6.4 Aux management

The auxiliary output can be controlled by a number of sources: Key, Supervisor, Digital input. and Time band.

Aux is switched on and off according to the following events:

Aux;	**Action**
Key	Pressing the key
Supervisor	Variation in value from the supervisor
Digital input	Change in the status of the contact (opening/closing)
Time band	According to day, hour, minutes of switching ON/OFF.

Therefore, if the digital inputs are stable, the aux output can always be activated and de-activated from the keypad.

IMPORTANT: the timed switch ON and/or OFF events (parameters tON and tOFF) of light or aux (according to parameter H8) are always active in OFF status too.

6.5 Light management

Light can be controlled by a number of sources: Key, Supervisor, Door switch and Curtain switch.
The light is switched on and off in the following events:

Light	Action
Key	Pressing the key
Supervisor	Variation in value from the supervisor
Door switch	Change in the status of the contact (opening/closing)
Curtain switch	Change in the status of the contact (opening/closing)
Light sensor	On detecting light or darkness

When the digital inputs (selected as door or curtain switches) are stable, the light can always be switched on or off from the keypad or the supervisor.
IMPORTANT: the door switch features two different algorithms for switching the light on/off.

6.6 Defrost

The parameter 'dC' establishes the measurement unit for the times set by the parameters dI (defrost interval) and dP1, dP2 (maximum defrost duration).

If the auxiliary relay is selected as the auxiliary evaporator defrost output (H1), the defrost is performed at the same time on both evaporators.

The parameter d/1 displays the defrost probe set for the main evaporator (the first probe assigned as a defrost probe).
The parameter d/2 displays the defrost probe set for the secondary evaporator (the second probe assigned as a defrost probe).

If no probes have been assigned to the defrost function (main or secondary evaporator), the defrost will end by timeout, after the periods dt1 and dt2.

6.6.1 Defrost events

The following events activate the defrost function:

Event	Implementation	Condition
Interval between defrosts dI expired	Depending on enabling status	At the expiry of the interval
Expiry of RTC trigger	Depending on enabling status	-------
Compressor running time	Depending on enabling status	When the defrost starts
Interval between defrosts dI expired with skip defrost algorithm	Depending on enabling status	At the expiry of the interval
At start-up	Depending on enabling status	At start-up + d5
Digital input	Depending on enabling status	When the defrost starts
Supervisor	Always	--------
Keypad	Always	--------

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Implementation of defrost depending on enabling status:
If a digital input is configured to enable the defrost, the defrost is performed when such input is in the enabling status, otherwise it stays pending.

IMPORTANT: defrost started from the keypad or by the supervisor is always performed, even when there is a delayed defrost request from external digital input or if there is a defrost enabling input (in non-enabled or delayed status).

WARNING: if parameter r3 is set to 1 (Direct) or 2 (Reverse), defrost is never performed.

6.6.2 Defrost request status

This status exists when one of the events that activates the defrost is present, but defrost cannot be started and, therefore, is put on hold for the following reasons:.

- Compressor and fans start-up delay (c0), as they delay activation of the compressor;
- Compressor protection times (c1, c2, c3), as they delay the activation of the compressor;
- Low pressure alarm (only with hot gas defrost), as this delays the activation of the compressor;
- Continuous cycle running;
- Pump down procedure running, because this delays compressor activation;
- Defrost delay at start-up (d5);
- Defrost delay from digital input configured as defrost start or enable (d5);
- Enable defrost (A4, A5, A9);
- Immediate alarm from external digital input (A4, A5, A9) because it delays compressor activation;
- Immediate alarm of time 7A from external digital input (A4, A5, A9) because it delays compressor activation;
- High condenser temperature alarm (only with hot gas defrost), because it delays compressor activation;
- Opening of the door (only with hot gas defrost if the compressor is subject to the door management algorithm).

6.6.3 Starting the defrost

The defrost is performed by electric heater or hot gas, according to the value of parameter d0.
If defrost by temperature has been selected, the defrost is performed only if the evaporator probe reading is less than the end defrost temperatures (dP1 and dP2), or if there is a probe error. This is also true in the case of two evaporators.
In the electric heater defrost:

- the compressor stops (Pump-Down is run, if enabled);
- the time d3 elapses;
- the defrost relay relating to the main evaporator is activated, to turn the heaters on;
- the defrost relay for the auxiliary evaporator is activated, to turn the heaters on;

In hot gas defrost:

- the compressor starts;
- the time d3 elapses;
- the defrost relay for the main evaporator is activated, to open the hot gas valve;
- the defrost relay for the auxiliary evaporator is activated, to open the hot gas valve.

6.6.4 Defrost in progress

During the defrost procedure, the display is controlled according to the setting of parameter d6. If during this procedure, the opening of the door is detected by the external digital contact, the compressor is stopped (running the Pump-Down procedure, if enabled).
When the door closes, the compressor resumes the status envisaged for the selected defrost procedure. During the defrost, the status of the fans is determined by setting of parameter F3
Note 1 : if the defrost probe is specified for the second evaporator, but the second evaporator defrost output is not used, the defrost on the second evaporator is performed using the output for the first evaporator.

Note 2 : if the defrost probe is not specified for the second evaporator, but the second evaporator defrost output is used, the defrost on the second evaporator is performed by time or considering the temperature of the first evaporator.

6.6.5 End defrost

The defrost ends by temperature (dt1, dt2) or by time (dP1, dP2) according to the setting of parameter d0.
If defrost by temperature is selected, it may also end by timeout (dP1', dP2') and, in this case, according to the setting of parameter A8, signal Ed1 or Ed2 is displayed.
In the case of an error in the probe selected for the defrost (main or auxiliary evaporator), it is always performed by time, with the timeout signal if enabled (Ed1 or Ed2).
In the case of two evaporators, the defrost ends when both the evaporators have reached the end defrost condition. If one evaporator finishes the defrost (by time or by temperature) before the other, the corresponding defrost relay is de-energised, while the compressor remains in the status required by the defrost.
The defrost is ended early in the following situations:

- changeover from Direct operating mode with defrost to Reverse-cycle mode (heating), by parameter (r3) or the digital input (A4, A5);
- end of enabling signal from external digital contact (the defrost request remains pending);
- instrument switched OFF from the keypad, supervisor and digital input;
- end defrost from supervisor and keypad.

If the defrost is completed early, the dripping and post-dripping (with the fans OFF) phases are not performed, as if the times were 0.

Special case: if the controller is running a hot gas defrost and a low pressure alarm occurs, the compressor will stop due to the low pressure alarm, and the defrost will probably end by timeout.

At the end of the defrost:

- the compressor is stopped (hot gas) and Pump-Down is run (if enabled), if a dripping time is set (dd);
- the fans are stopped, if a dripping time (dd) or fans off for post-dripping (Fd) is set;
- the defrost relay is disabled;
- the alarm bypass time after defrost is set (d8);
- any pending defrost requests are reset.

If the dripping time is set to zero, the compressor remains in the previous status, and normal control resumes directly.
If the dripping and post-dripping times are set to zero, the compressor and the fans remain in the previous status, and normal control resumes.

6.6.6 Dripping

Dripping time is set by parameter dd in this status

- the compressor is OFF;
- the fans are OFF.

At the end of dripping time, the post-dripping phase starts with the fans OFF (Fd):
- the compressor restarts normal operation;
- the fans are stopped.
If the post-dripping time with fans OFF is set to zero, normal control is resumed directly.

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6.6.7 Post-dripping (fans OFF)

The post-dripping time with fans OFF is set by parameter Fd.
At the end of the post-dripping time with fans OFF, normal control resumes.

6.6.8 Notes on the defrost function

- If defrost with RTC is selected, the parameter dI has no effect on the days when defrost events are set.
  In any case, the dI timer is updated and the parameter becomes valid on all days only in the event of RTC alarms.

- The timer used to determine the defrost interval dI is updated cyclically when reaching the end of the interval. thus enabling cyclic defrosts. The timer is also updated when the unit is OFF. If the timer dI expires when the unit is OFF, a defrost is performed when the unit is started. If an "RTC" or manual defrost is run from the keypad or the supervisor, the timer linked to dI is not reset at the start of the defrost. Consequently, at the end of defrost, the dI timer expires, and another defrost is performed. If a defrost is run from the digital input or by the compressor running time algorithm, the timer dI is reset when the defrost request is generated. In this way, the defrost interval is a timeout for the generation of the defrost requests (used, for example, when the external timer is not working correctly). If defrost on start-up (d4) has been selected, and a defrost on start-up delay (d5) has been set, the timer dI must be set to the end of the defrost delay on start-up. For units programmed in the same way, and with the same value of 'dI' and different values of 'd5', this enables the defrosts at start-up to be distributed through time, and the time staggering of the defrosts to be maintained for the subsequent events too.

6.7 New defrost activation modes

With this controller, defrosts can be managed in three different modes, in addition to the standard mode:

6.7.1 Defrost according to compressor running time

To enable the controller for this operating mode, set a value >0 for parameter d10.
This mode affects start defrost, that is, according to the evaporator temperature (parameter d11), the controller checks the compressor running time (parameter d10) and decides whether to activate the defrost or not.
There are two parameters:

- **d10:** compressor running time, with the evaporation temperature less than the threshold, after which a defrost request is generated.
- **d11**: evaporation temperature threshold.

The defrost is generated if the compressor has operated

- for time **d10**;
- with an evaporator probe reading less than **d11**.

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If there are two evaporators, two separate timers will be installed for each evaporator, and the count of each timer will be activated whenever the compressor is ON and relevant evaporation probe is below threshold **d11**. The defrost will start when at least one of the two timers has expired, that is, when at least one of the evaporators has operated for the time **d10** below the temperature threshold **d11**.

6.7.2 Defrost at variable intervals.

To enable the controller for this operating mode, set parameter d12=1.
In this mode, the control algorithm, according to the duration of the previous defrost, increases or decreases the defrost interval (dI) proportionally for the following defrosts.
The following parameters are associated with this function:

- d I: interval between defrosts;
- d12: enable the function;
- dn: nominal duration of the defrost, in proportion to the set defrost timeout (value expressed as a %);
- dP1 and dP2: maximum defrost duration for evaporator 1 and 2;
- dH: control proportional factor.

The algorithm calculates with the following formulae: $dn1 = \frac{dn}{100} dP1$ and $dn2 = \frac{dn}{100} dP2$ the nominal defrost times dn1 and dn2 (in the case of the second evaporator) obtained as percentages dn of dP1 and dP2.

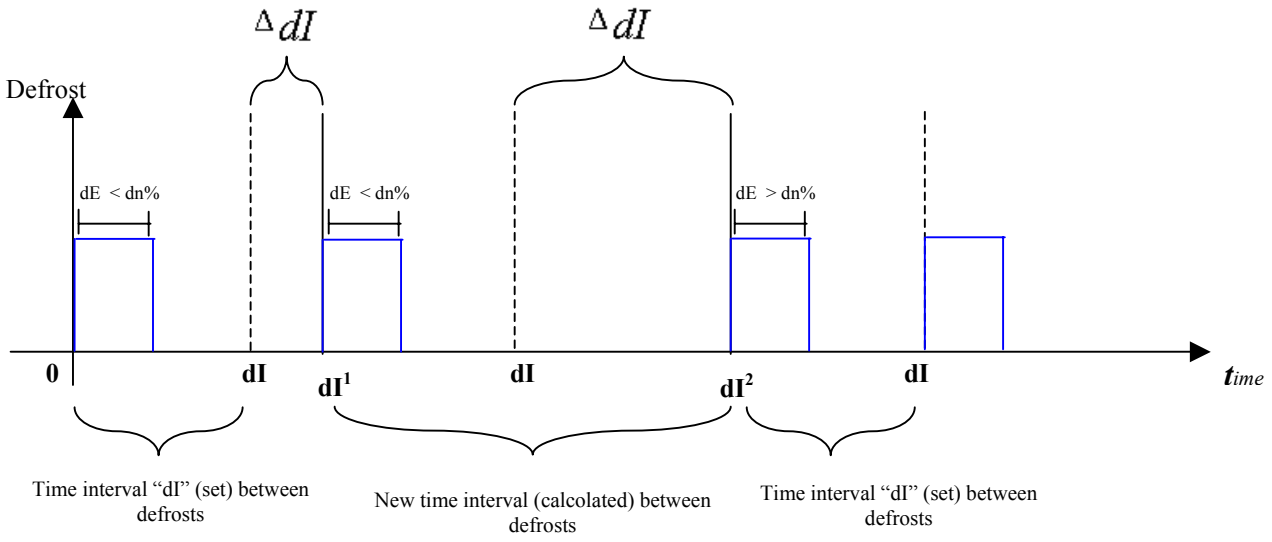
Therefore, if a defrost lasts less than the set time "dn", the algorithm proportionally lengthens (depending on the value assigned to parameter dH) the next defrost interval "dI^n".

The parameter 'dH' is a proportional factor that amplifies or attenuates the variation of "dI^n".

$$\Delta dI = \left[\left(\frac{dn}{100} - \frac{dE^*}{dP} \right) \cdot dI \cdot \frac{dH}{50} \right]$$

dE* = effective defrost duration

$$dI^n = dI + \Delta dI$$



Example:
If, for example, the defrost interval (dI) is set to 8 hours and the maximum defrost duration (dP1 or dP2) is set to 30 minutes, however usually the defrost is required for 50% less than the time dP1 or dP2, set parameter dn = 50%. The control algorithm will calculate, using the formula dn/100 ∗ dP1= dn1 or dn/100 ∗ dP2= dn2 (in the case of the second evaporator), the nominal defrost times "dn1" or "dn2", which, in the example shown, corresponds to 15 minutes, that is, 50% of dP.
The new interval dI^1 for the next defrost is calculated by the algorithm, using the formula:

$$dI^1 = dI + \left[\left(\frac{dn}{100} - \frac{dE}{dP}\right) \cdot dI \cdot \frac{dH}{50}\right]$$

Preliminary version

where by setting the parameter dH (proportional factor for the variation in dI) between 0 an 100, a proportional gain from 0 to 2 can be selected. If dH = 50, the proportional factor has no effect.
At this point, if the defrost ends after 10 minutes (dE), replacing the known values in the formula gives:

$$dI^1 = 8 + \left[\left(\frac{50}{100} - \frac{10}{30}\right) \cdot 8 \cdot \frac{dH}{50}\right]$$

consequently

$$dI^1 = 8 \cdot \left[1.167 \cdot \frac{dH}{50}\right]$$

It is therefore clear how the factor dH increases or decreases the new dI^1.

6.7.3 Defrost at intervals calculated according to the duration of the previous defrost: Skip defrost

To enable the controller for this operating mode, set the parameter d12=2.
In this mode, according to the duration of the last defrost operation, the controller establishes whether the next defrost is skipped or not.
The following parameters are associated with this function:

- d12: enable the function;
- d I: interval between defrosts;
- dn: nominal duration of the defrost, in proportion to the defrost timeout (value expressed as a %);
- dP1 and dP2: maximum defrost duration for evaporator 1 and 2.

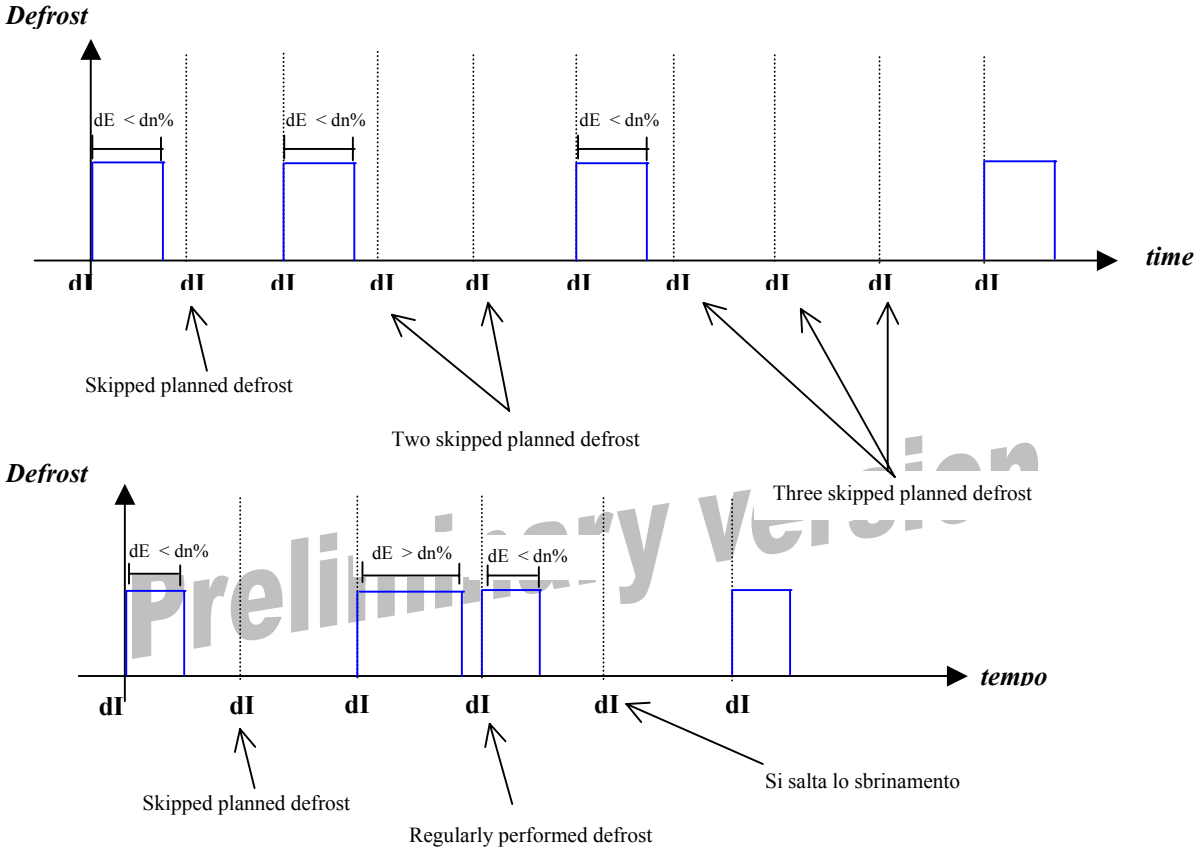
When setting these parameters correctly, the algorithm calculates, using the following formulae: $dn1 = \frac{dn}{100} dP1$ and

the nominal defrost times dn1 and dn2 (in the case of the second evaporator) obtained as percentages dn of dP1 and dP2.

This function is based on a very simple but very effective principle. If the defrost lasts less than or equal to the time dn1 or dn2 (calculated with the formulae shown above), the next defrost due after the time “dI” will be skipped.
When the next defrost is performed, the check is repeated, and if the outcome is the same, then the following two due defrosts are skipped, and so on according to the criteria described above (maximum 3 successive defrosts skipped).
If 3 consecutive defrosts are skipped and the actual defrosting time is still less than dn%, the cycle is terminated and the controller will skip one more defrost.
As soon as the defrost time exceeds dn% of the time "dP", the next defrost will be performed and the function will start again.
The algorithm counts the defrosts to be skipped.

- if defrost finishes in less time than dn1, the counter of the defrost operations to be skipped is increased by 1. The current value of the counter indicates the defrost operations to be skipped;
- if the defrost ends normally, the next defrost is performed as normal;
- when the counter reaches the value 3, three defrosts are skipped, and then the counter is reset to 1;
- when the instrument is switched on, the defrost is performed the first 7 times without increasing the counter, after which the counter can be updated (from the eighth defrost on).

The following is a graphical description of the function:



Preliminary Version

This function should be used with the programming of the defrosts equally distributed over the day (e.g. cyclical defrosts, parameter "dI"). This prevents skipping defrosts that would be the last before a long period programmed without defrosts (for example, when the clock is used to program the defrosting of the utility at night only).

6.7.4 Defrost according to the duration of the previous defrost with skip defrost and variable dI (combination of 1 and 2)

To enable the controller for this operating mode, set parameter d12=3.
In this mode, the controller performs the defrosts considering both the duration of the previous defrost and the possibility of skipping the defrost, and the interval set using parameter dI.

- d I: interval between defrosts;
- d12: enable the function;
- dn: nominal duration of the defrost, in proportion to the set defrost timeout (value expressed as a %);
- dP1 and dP2: maximum defrost duration for evaporator 1 and 2;
- dH: control proportional factor.

The algorithm calculates with the following formulae: $dn1 = \frac{dn}{100} dP1$ and $dn2 = \frac{dn}{100} dP2$ the nominal defrost times dn1 and dn2 (in the case of the second evaporator) obtained as percentages dn of dP1 and dP2.

The parameter ‘dH’ is a proportional factor that amplifies or attenuates the variation of “dI^{n}”.

$$dI^{n} = dI + \left[\left(\frac{dn}{100} - \frac{dE}{dP} \right) \cdot dI \cdot \frac{dH}{50} \right]$$

Consequently, in this operating mode, if a defrost lasts less than the time "dn" established, the algorithm will proportionally add (according to the value assigned to parameter dH) the time remaining from the previous defrost to the following defrost interval "dI^{1}" (see paragraph 6.5.2). In addition to this, the algorithm will skip, using the "skip defrost" principle (see paragraph 6.5.3) the next defrost/defrosts depending on the value reached by the skip defrost counter (from 1 to 3).

6.8 Pump down and low pressure

6.8.1 Enabling the function

The Pump-Down function is activated by setting parameter 'c7' (pump down duration) to any value other than zero. The Pump-Down valve must be connected to the auxiliary output, setting the relevant parameter (H1).
In addition, one of the digital inputs ('A4', 'A5') must be set as a low pressure input.

6.8.2 Pump down function

When the Set Point is reached, if the minimum compressor ON time 'c3' has elapsed, the controller closes the Pump-Down valve, stopping the refrigerant gas on the compressor suction side.

Parameter 'c10' can be used to select Pump-Down by pressure. In this case, once the Pump-Down valve closes, the compressor continues to operate until reaching the low pressure value or the time 'c7'. When this time elapses, the compressor is switched OFF, irrespective of the status of the low pressure input and the 'Pd' alarm (Pump-Down ended by timeout) is disabled.
In this case, the compressor autostart function in Pump-Down is disabled.

Note: if the shut-down request occurs when the compressor is off and the valve open (since, following the opening of the valve, the compressor has not yet started again), the routine closes the valve and if necessary starts the Pump-Down procedure if not in low pressure (if autostart and Pump-Down by pressure is enabled).

When the controller requests the activation of the compressor, if the minimum OFF time 'c2' and the minimum time between two starts of the compressor 'c1' have elapsed, the pump down valve is opened, allowing the refrigerant gas to return to the compressor intake. The compressor is started after the delay time 'c8' from the opening of the valve.

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Note: if the start request occurs when the compressor is ON and the valve OFF (as it is in Pump-Down or autostart mode), the valve is opened immediately.

6.8.3 Compressor autostart in Pump-Down

Parameter 'c9' is used to enable the compressor autostart function in pump down status. Once the compressor has been stopped in pump down due to low pressure, if the low pressure switch signals an increase in pressure, due to the faulty seal of the pump down valve, the compressor is started again until it reaches the low pressure value.
The compressor autostart function considers the minimum OFF time 'c2' and the time between two starts 'c1', while minimum ON time is ignored. Consequently, when reaching the low pressure value, the compressor is stopped even if time 'c2' has not elapsed. The activation of a compressor autostart cycle in Pump-Down is signalled by the message 'AtS'on automatic restoration of the next correct Pump-Down cycle.

6.8.4 Low pressure alarm

The low pressure alarm 'LP' is signalled when the pressure switch signals a low pressure situation with the pump down valve open and the compressor operating. The low pressure alarm signal is nonetheless delayed by the time set for parameter 'A7'.
Low pressure is not signalled during the compressor start-up phase (opening of the pump down valve and subsequent activation of the compressor after the time 'c8'), during shutdown of the compressor in pump down and during the compressor autostart cycle in pump down.
The low pressure alarm shuts off the pump down valve and the compressor, and is on automatic reset.
The low pressure alarm can be reset in any situation.

6.9 Continuous cycle

Pressing for more than 5 seconds activates the continuous cycle function.
During continuous cycle operation, the compressor continues to operate, independently of the controller, for time 'cc', to lower the temperature even below the Set Point.
If time 'cc' is set to 0, the continuous cycle is never activated.
The continuous cycle is stopped after the time 'cc' or when reaching the minimum specified temperature, corresponding to the minimum temperature alarm threshold ('AL').

If, after the end of the continuous cycle, the temperature falls by inertia below the minimum temperature threshold, the low temperature alarm signal can be ignored by suitably setting the alarm bypass delay time after continuous cycle, ‘c6’.

6.9.1 Events that activate the continuous cycle

- Pressing aux for more than 5 seconds.

6.9.2 Events that do not activate the continuous cycle

- duration of the continuous cycle (cc) is set at 0;
- the temperature is below the low level threshold;
- in Reverse operation (hot), from parameter (r3) or from digital input (A4, A5),
- in OFF state

6.9.3 Continuous cycle request status

This status exists when the activation of the continuous cycle is requested, however it cannot be started for one of the following reasons:

- compressor protection times (c1, c2, c3), as they delay activation of the compressor;
- immediate or delayed alarm from external digital input (‘A4’, ‘A5’, ‘A9’), if this delays activation of the compressor;
- defrost, dripping or post-dripping in progress;
- compressor and fan start delay on start-up;
- door open (*see Continuous cycle in progress, below*);
- low pressure alarm (‘LP’) active, as this delays activation of the compressor;
- high condenser temperature alarm (‘CHt’) as this delays activation of the compressor.

During the continuous cycle request, the icon flashes.

6.9.4 Continuous cycle in progress

When the continuous cycle is running:

- The compressor is always ON;
- The low temperature alarm is deactivated;
- The icon is on steady.

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If, during the continuous cycle, the door is opened and one of the digital inputs is set to manage the opening of the door, the compressor stops and consequently the continuous cycle is temporarily interrupted. When the door closes the continuous cycle starts from where it left off, and thus ,in practice, the continuous cycle duration timer (‘cc’) is put on hold when the door is opened, and starts again when the door closes.

6.9.5 End of the continuous cycle

The continuous cycle ends in the following ways:

- push-button aux pressed for more than 5 seconds;
- minimum specified temperature (‘AL) reached;
- maximum duration of the continuous cycle (‘cc’) reached;
- instrument switched off (OFF) from the keypad or supervisor;
- changeover from Direct or Indirect operating mode with defrost to Reverse-cycle mode (heating), by parameter (r3) or the digital input (A4, A5);

The low temperature alarm is bypassed for a time (‘c6’) from the end of the continuous cycle.

6.10 High condensing temperature alarm

If a probe is set as a condenser probe (‘/A2’, ‘/A3’, ‘/A4’, ‘/A5’), the condensing temperature can be monitored and a high temperature condition signalled, probably due to situations of fouling and obstruction.
If no condenser probe is selected, the condenser pre-alarm and alarm are disabled. The condenser fan output, if selected, is always OFF.

The condenser high temperature threshold can be set with the Ac parameter and with a hysteresis used for activating the condenser high temperature alarm and for adjusting the condensation fans by parameter AE.

If the condenser temperature is >‘Ac’+ (‘AE’/2), the pre-alarm is signalled, and there is no modification to the status of the loads, but the display simply shows message ‘cht’.
If in the pre-alarm situation the condenser temperature falls to <‘Ac’, the pre-alarm ends and signal ‘cht’ disappears.
If, instead, the condenser temperature is >‘Ac’ + ‘AE’, the alarm delay timer is started (this can be set using the parameter ‘Acd’).
If, at the end of delay ‘Acd’, the temperature is still above the threshold ‘Ac’ + ‘AE’, the alarm ‘CHt’ is activated, the message ‘CHt’ is shown on the display and the compressor is stopped, without observing the safety times (‘c1’, ‘c2’, ‘c3’). ***Alarm ‘CHt’ is manual***

reset. If, on the other hand, the temperature returns below the threshold, the timer is reset and the pre-alarm status or normal operation resumes.

The auxiliary relays can be set as condenser fan outputs ('H1'), which are activated if the condenser temperature is >'Ac' and are deactivated if the condenser temperature is <'Ac'-'AE'.
In the event of a condenser probe error, the pre-alarm 'CHt' and the alarm 'CHt' are generated automatically.
In the above situation, any auxiliary outputs configured accordingly are activated.

Condenser probe	Pre-alarm	Alarm	Condenser fan outputs selected
Not present	Not generated	Not generated	OFF
Error	Generated	Generated	ON

6.11 HACCP (Hazard Analysis and Critical Control Point)

This function allows advanced control of the operating temperature and the recording of any anomalies due to power failures or increases in the operating temperature due to various causes (breakages, severe operating conditions, operator errors, etc…). This function can only be activated on the controllers with the RTC option fitted. There are two types of HACCP alarm, signalled on the display with the following codes respectively: HA and HF

"HA" - if, during operation, the temperature measured is higher than the threshold set for the parameter "AH" (high temperature alarm threshold) for a time T_h higher than the sum of the parameter "Ad" (specific HA alarm delay for HACCP) and the parameter "Htd" (temperature alarm detection delay), the HA alarm is generated.

- HA alarm: If the control temperature is higher than the threshold value "AH" for a certain time T_h
  Where:
  "AH" = High temperature alarm threshold (check if the programming of parameter "A1" is set for relative or absolute values);
  T_h = Ad + Htd;

  Ad: Temperature alarm delay;
  Htd: HA HACCP alarm delay.

When the event occurs, the following data are saved:
- hour, minutes and day of the week;
- type of alarm;
- maximum temperature reached after the activation of the alarm;
- duration of the alarm.

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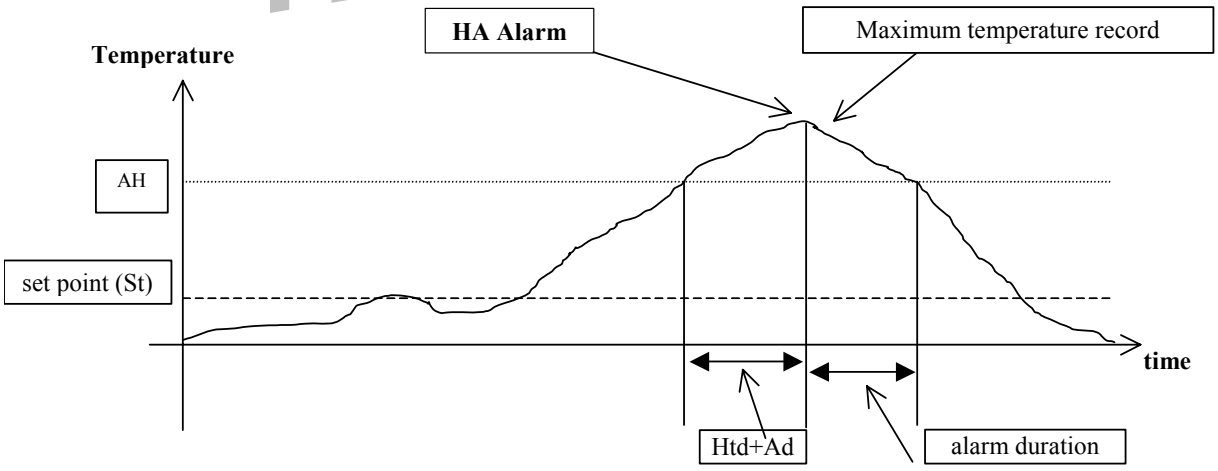
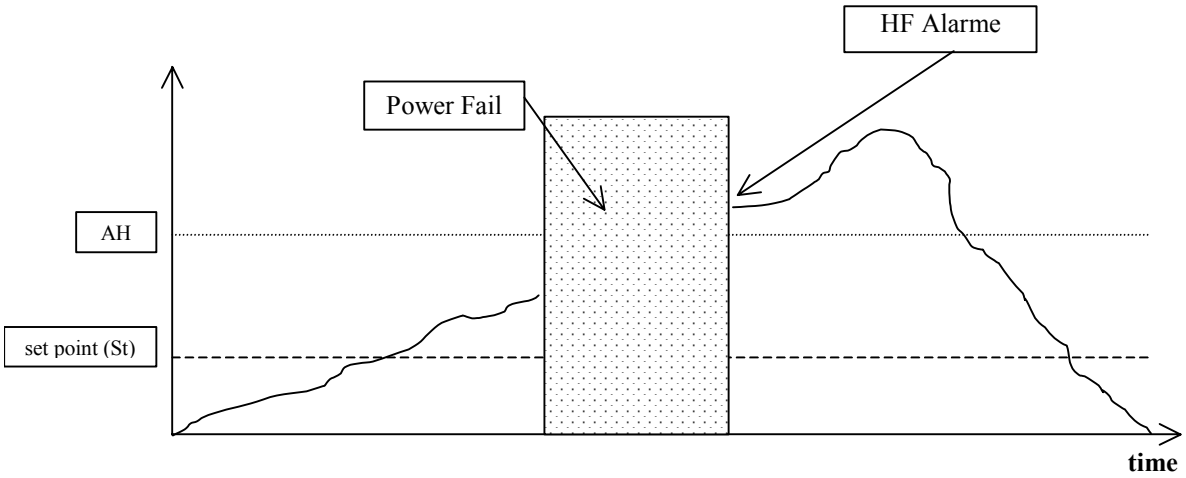


"HF" – this occurs after a power failure for an extended time (>1 minute) if, when power returns, the temperature is higher than the threshold set for the parameter "AH": the absolute value of AH, if "A1"= 0; the relative value given by "AH" + "St", if "A1"= 1.

The following data are saved:
- hour, minutes and day of the week;
- type of alarm;
- maximum temperature reached after the activation of the alarm;
- duration of the power failure.



The activation of one or both of the alarms causes the HACCP LED to flash and the display of the alarm code, as well as the recording of the alarm to the E^2PROM and the activation of the alarm relay or buzzer (if present).

Pressing SET and def for more than 5 seconds, resets the flashing of the HACCP LED, the HA and/or HF signal and reinitialises the monitoring of HA.

Pressing PRG mute mutes the buzzer and resets the alarm relay (if present).

The date and time of the last 3 alarms. HA and HF. can be displayed by using 6 parameters HA,HA1,HA2 and HF,HF1,HF2. The activation of a new 'HA' or 'HF' alarm causes scrolling of the list of the last 3 alarms, deleting the oldest event. The new alarm can be displayed using the parameter that identifies the most recent alarm, that is, 'HA' or 'HF'. The counter of the 'HAn' or 'HFn' alarm events is increased, up to a maximum value of 15.

Note: *the HF alarm is acquired and the corresponding data saved only if the power failure lasts more than 1 minute.*

Preliminary version

7. Description of the operating parameters

7.1 Temperature probe management parameters

No.	Code	Parameter	MSYF	UOM	Type	Def.	Max	Min
1	/2	Measurement stability	MSYF	-	C	4	15	1
2	/3	Probe display slow-down	MSYF	-	C	0	15	0
3	/4	Virtual probe	MSYF	-	C	0	100	0
4	/5	Select °C or °F	MSYF	flag	C	0	1	0
5	/6	Decimal point	MSYF	flag	C	0	1	0
6	/tI	Display on internal terminal	MSYF	-	C	1	6	1
7	/tE	Display on external terminal	MSYF	-	C	0	6	0
8	/P	Select type of probe	MSYF	-	C	0	2	0
9	/A2	Configuration of probe 2	M-YF	-	C	2	3	0
			-S--	-	C	0	3	0
10	/A3	Configuration of probe 3	MSYF	-	C	0	3	0
11	/A4	Configuration of probe 4	MSYF	-	C	0	3	0
12	/c1	Calibration of probe 1	MSYF	°C/°F	C	0.0	20	-20
13	/c2	Calibration of probe 2	MSYF	°C/°F	C	0.0	20	-20
14	/c3	Calibration of probe 3	MSYF	°C/°F	C	0.0	20	-20
15	/c4	Calibration of probe 4	MSYF	°C/°F	C	0.0	20	-20

/2: Measurement stability

Defines the coefficient used to stabilise the temperature reading. **Low values** assigned to this parameter allow a prompt response of the sensor to temperature variations, but the reading becomes more sensitive to disturbance. **High values** slow down the response, but guarantee greater immunity to disturbance, that is, a more stable and more precise reading.

The parameter "/2" acts on the temperature measurements, filtering the minimum variations, and at the same time considers the average value of the measurements made.

/3: Probe display rate

This parameter is used to set the rate at which the temperature display is updated. The temperature shown on the display tends to follow rapid deviations away from the set point very slowly, and vice-versa, moves very quickly in the event where the temperature displayed is approaching the set point. If the control temperature exceeds the high or low temperature thresholds and an alarm is activated, 'AL' or 'AH', or if the maximum number of filtering steps (255) is exceeded (see the Timeout column in the table below), the filtering would immediately be bypassed and the temperature displayed would be the temperature effectively measured, until all the alarms are reset. The action of the parameter '/3' only affects the temperature displayed, and not the temperature used for the control functions.

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Important:

- the adjustment temperature actually measured differs from the displayed value, and, therefore, the outputs may not be activated with reference to the latter temperature value.
- the parameter /3 acts on the temperature displayed by the instrument, if /tE=0 (no probe displayed by the repeater display); if the repeater display is envisaged (/tE <> 0), the parameter /3 will act on the temperature displayed by the repeater.

Example: in the case of "bottle coolers", typically used in supermarkets, when the doors are opened frequently, due to the greater thermal inertia of the liquids compared to the air, and the fact that the probe is positioned in the air and not directly on the products, the instrument measures a temperature that is higher than effective temperature of the soft drinks, thus displaying a quite "unrealistic" temperature. Setting the parameter '/3' to a value other than 0, any abrupt variations in temperature are "filtered" on the display, showing a temperature trend that is "closer" to the actual trend of the product temperature. The following table shows the possible values of '/3' and the corresponding display delayed update values (Tdel).

Par. value /3	Display delay (Trit)	Timeout
0	Disabled	0
1	5 s	21 min.
2	10 s.	42 min.
3	15 s.	64 min.
4	20 s.	85 min.
5	25 s.	106 min.
6	30 s.	127 min.
7	40 s.	170 min.
8	50 s.	212 min.
9	60 s	255 min.
10	75 s	319 min.
11	90 s	382 min.
12	105 s	446 min.
13	120 s	510 min.
14	150 s	637 min.
15	180 s	765 min.

/4: Probe average (virtual probe)
This parameter is used to choose whether to control the temperature based solely on the room probe reading, or alternatively whether to refer to the "weighted" average of the room probe S1 and probe 2 (S2, see the parameter '/A2').
This parameter is useful in special applications.

Example: if the ambient probe is put in suction mode, and probe 2 in delivery mode, adjustment can be effected on the weighted average of the 2 read values.
The formula used is: ***probe average (Virtual probe) = ((S1* (100 - P)) + (S2*P)) / 100*** where:
S1 = ambient probe;
S2 = probe 2;
P = value of the parameter '/4'.

Virtual probe:
- '/4'=0 control is performed using the ambient probe. This is the typical situation.
- '/4'=100 control is performed in reference to the values read by probe 2.
- '/4'=50 the controller refers to a "virtual" probe, calculated from the average between the ambient probe and probe 2. With values above 50, probe 2 has a greater weight in the calculation, vice-versa for values below 50.

Note: in the event of faults or if probe 2 is not enabled, the instrument uses the ambient probe only. If the fault is on the ambient probe, the "Control probe" error is signalled.
Default: '/4'=0 => control on ambient probe.

/5: Select °C or °F
Defines the measurement unit (degrees Centigrade or degrees Fahrenheit) shown on the display.
/5=0 to work in degrees Centigrade.
'/5'=1 to work in degrees Fahrenheit.
Default: '/5'=0 => operation in degrees centigrade.

/6 : Decimal point
Used to enable or disable the display of the temperature with resolution to the tenth of a degree between -20 and + 20.
NOTE: the exclusion of the decimal point is active only with reference to the display of the reading on the main and remote displays; the parameters are always set to the tenth of a degree.

'/6'=0 the readings are displayed to the tenth of a degree;
'/6'=1 the readings are displayed without the tenths of a degree.

Default: '/6'=0 => decimal point displayed.

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/tI : Probe displayed on instrument
For selecting the probe to be displayed by the instrument.
'/tI'=1 => Virtual probe;
'/tI'=2 => Probe 1;
'/tI'=3 => Probe 2;
'/tI'=4 => Probe 3;
'/tI'=5 => Probe 4;
'/tI'=6 => Do not select.

Warnings:
- Control is always based on the virtual control probe;
- If the probe to be displayed has not been enabled, the display will show the message '____';

Default: '/tI'=1 => Virtual probe;

/tE : Probe displayed on external terminal
Selects the probe to be displayed on the remote terminal.
'/tE'=0 => Remote terminal not present
'/tE'=1 => Virtual probe;
'/tE'=2 => Probe 1;
'/tE'=3 => Probe 2;
'/tE'=4 => Probe 3;
'/tE'=5 => Probe 3;
'/tE'=6 => Do not select.

Warnings:
- Control is always based on the virtual control probe;
- If the probe to be displayed has not been enabled or is in error, the display will show the message '____';
- If the probe to be displayed is in error, the display will show the message '___';
- If the terminal is not present, the display will remain completely dark.

Default: '/tE'=0 => Remote terminal not present

/P: Select type of probe
Used to select the type of probe used for the measurements.
'/P'=0 => NTC Standard with range –50T90 °C
'/P'=1 => NTC Standard with range –40T150 °C
'/P'=2 => PTC Standard with range –50T150°C
For correct readings from the PTC probes, the hardware must be prepared to accept PTC readings (as well as NTC).
Default: '/P'=0 => NTC Standard with range –50T90 °C
Available on all models fitted with NTC inputs.

/A2 : Configuration of probe 2
Used to configure the operating mode of probe 2.
'/A2'= 0 => Probe 2 absent;
'/A2'= 1 => Product probe (used for display only);
'/A2'= 2 => Defrost probe;
'/A2'= 3 => Condensation probe.

In any case, probe 2 is used for calculating the virtual control probe.

Default: '/A2'= 2 => Defrost probe; '/A2'= 0 on model S => Probe 2 absent.

/A3: Configuration of probe 3
Used to configure the operating mode of probe 3.
'/A3'= 0 => Probe 3 absent/Digital input;
'/A3'= 1 => Product probe (used for display only);
'/A3'= 2 => Defrost probe;
'/A3'= 3 => Condensation probe.

Default: '/A3'= 0 => Probe 3 absent.

/A4: Configuration of probe 4
Used to configure the operating mode of probe 4 in the models that are fitted with it.
/A4 = 0 => Probe 4 absent/Digital input;
/A4 = 1 => Product probe (used for display only);
/A4 = 2 => Defrost probe;
/A4 = 3 => Condensation probe.
Default: /A4 = 0 => Probe 4 absent.

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/C1 : Calibration or offset for probe 1
/C2 : Calibration or offset for probe 2
/C3 : Calibration or offset for probe 3
/C4 : Calibration or offset for probe 4

These parameters are used to correct the temperature measured by the probes, using an offset. The value assigned to these parameters is in fact added to (positive value) or subtracted from (negative value) the temperature measured by the probes.
The temperature value is corrected by the offset before checking if the reading is off-range.

Example: to decrease the temperature measured by probe 1 by 2.3 degrees, set '/C1'= -2.3.
The calibration or offset can be set from -20 to +20.

Warning: if the probe is disabled, the display shows the string '___'. In the event of a probe error, the display shows the corresponding error message.

When displaying the parameter, pressing SET shows the value of the corresponding probe already corrected with the offset; pressing SET again displays the code.

Default: '/C1'= 0 => no offset for the reading of probe 1.
'/C2'= 0 => no offset for the reading of probe 2.
'/C3'= 0 => no offset for the reading of probe 3.
'/C4'= 0 => no offset for the reading of probe 4.

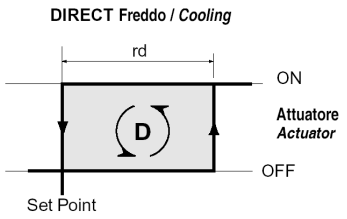
7.2 Temperature control parameters

No.	Code	Parameter	MSYF	UOM	Type	Def.	Max	Min
16	St	Temperature set point	MSYF	°C/°F	F	0.0	r2	r1
17	rd	Control delta	-SYF	°C/°F	F	2.0	20	0.1
18	r1	Minimum set point allowed	MSYF	°C/°F	C	-50	r2	-50
19	r2	Maximum set point allowed	MSYF	°C/°F	C	60	200	r1
20	r3	Operating mode	-SYF	flag	C	0	2	0
21	r4	Automatic night-time set point variation	MSYF	°C/°F	C	3.0	20	0.0

22	r5	Enable temperature monitoring	MSYF	flag	C	0	1	0
23	rt	Temperature monitoring interval	MSYF	hours	F	-	999	0
24	rH	Maximum temperature read	MSYF	°C/°F	F	-	-	-
25	rL	Minimum temperature read	MSYF	°C/°F	F	-	-	-

St: Set point
Establishes the set point value used by the controller.
Default: 'St'=0.0.

rd: Control delta
Establishes the value of the differential, or hysteresis, used for temperature control. Low values guarantee an ambient temperature that deviates only slightly from the set point, but involves frequent starts and stops of the main actuator (normally the compressor). In any case, the compressor can be protected by suitably setting the parameters that limit the number of activations/hour and the minimum OFF time (see the C parameters).
Default: 'rd'=2.



r1 : Minimum set point allowed
Determines the minimum value that can be set for the set point. Using this parameter prevents the user from setting a set point lower than the value indicated by 'r1'.
Default: 'r1'=-50.

r2 : Maximum set point allowed
Determines the maximum value that can be set for the set point. Using this parameter prevents the user from setting a set point higher than the value indicated by 'r2'.
Default: 'r2'=+60.

r3: Operating mode
ir33 can work as a thermostat and defrost controller for static units at normal temperature (r3'=0), as a simple thermostat in Direct operation ('r3'=1), or as simple thermostat in Reverse-cycle operation ('r3'=2).
'r3'=0 Direct thermostat with defrost control (cooling);
'r3'=1 Direct thermostat (cooling);
'r3'=2 Reverse-cycle thermostat (heating).
Also see the description of parameters 'A4'and 'A5'.
Notes:
1) with 'r3'=1 and 'r3'=2, the defrosts are always disabled.
2) a digital input set for direct/reverse-cycle control has priority over the operating mode.
Remember that in reverse-cycle operation, the differential is to the 'left' of the set point, as shown in the following figure.
Default: r3=0=> Direct thermostat operation with defrost control;

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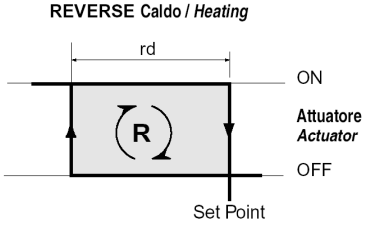


r4 : Automatic variation of the set point in night-time operation.
This parameter is part of the group for control of the "curtain switch", together with 'A4'and 'A5', programmable for configuring the digital inputs. When the "curtain" is closed (and, consequently, the digital input connected to the curtain switch is closed), the controller automatically increases the set point by the value assigned to 'r4' in direct mode (cooling), and automatically decreases the set point by the value assigned to 'r4', in reverse mode (heating).
Default: 'r4'=3.0.

r5 : Enable minimum and maximum temperature monitoring.

rt : Effective interval for monitoring the maximum and minimum temperature.

rH: Maximum temperature measured in the interval rt.

rL: Minimum temperature measured in the interval rt.

All these parameters are used for recording the temperature. These instruments can record the minimum and maximum temperature measured by the ambient probe in a period of up to 999 hours (over 41 days).
To enable this function, proceed as follows:

- set 'r5'=1;
- select 'rt';
- press SET to display for how many hours the minimum and maximum temperature have been recorded (if the function has just been enabled, 'rt'=0);
- to start recording the temperatures again, press def for more than 5 seconds when displaying the hours (the message 'rES' indicates that the value has been reset). The instrument resets the number of hours and restarts the monitoring process;
- to display the maximum temperature measured by the probe, read the value associated with 'rH';
- to display the minimum temperature measured by the probe, read the value associated with 'rL .

Note: after the maximum time of 999 hours, the monitoring of the minimum and maximum temperature continues, while the time value remains fixed at 999.

Warnings: if the instrument is not connected to a UPS unit, a temporary power failure will reset the values of 'rt', 'rL and 'rH'. and, therefore,, when power is restored, monitoring resumes automatically from rt = 0.
Default: 'r5'=0.

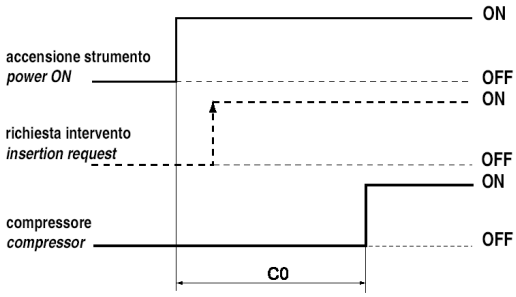
7.3 Compressor management parameters

No.	Code	Parameter	MSYF	UOM	Type	Def.	Max	Min
26	c0	Comp. and fan delay on start-up	-SYF	min	C	0	15	0
27	c1	Minimum time between successive starts	-SYF	min	C	0	15	0
28	c2	Minimum compressor OFF time	-SYF	min	C	0	15	0
29	c3	Minimum compressor ON time	-SYF	min	C	0	15	0
30	c4	Duty setting	-SYF	min	C	0	100	0
31	cc	Continuous cycle duration	-SYF	hours	C	0	15	0
32	c6	Alarm bypass after continuous cycle	-SYF	hours	C	2	15	0
33	c7	Maximum pump down time	-SYF	min	C	0	30	0
34	c8	Comp. start delay after open PD valve	-SYF	sec	C	5	60	0
35	c9	Enable autostart function in PD	-SYF	flag	C	0	1	0
36	c10	Select Pump down by time or pressure	-SYF	flag	C	0	1	0
37	c11	Second compressor delay	-SYF	sec	C	4	250	0

c0 : Compressor and fans start delay (if 'FAN' relay present) on start-up
When the controller is switched on, the compressor and the evaporator fans start after a delay (in minutes) equal to the value set for this parameter, in order to protect the compressor against repeated power-ups in the event of frequent power drops.

Example: setting 'c0'=6 obliges the compressor to wait 6 minutes before starting from when power returns.
In the event of systems with more than one compressor, the parameter 'c0' can also be used to avoid simultaneous starts of a series of units. Simply set a different value of 'c0' for each compressor.

Default: 'c0'=0 => no minimum delay is set when the compressor is started when switching the instrument on.



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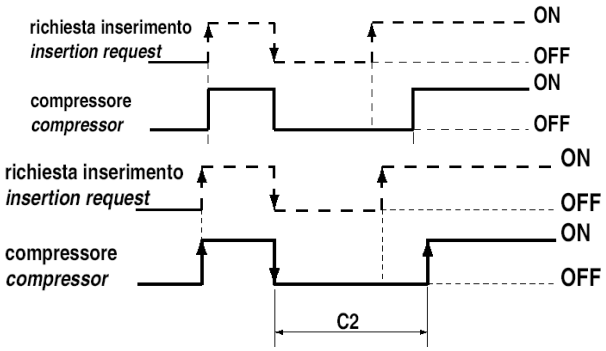
c1: Minimum time between two successive starts of the compressor

Sets the minimum time (in minutes) that must elapse between two starts of the compressor, irrespective of the temperature and the set point. Setting this parameter limits the number of starts per hour.

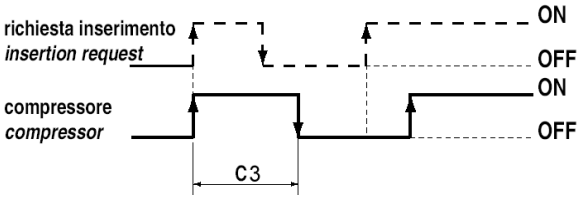
Example: if the maximum number of activations/hour allowed is 10, simply set 'c1'=6 to ensure that this limit is respected.

Default: 'c1'=0 => no minimum time is set between two starts.



c2 : Minimum compressor OFF time
Sets the minimum time (in minutes) for the compressor to remain OFF. The compressor is not started again until the minimum time selected ('c2') has elapsed from when it last stopped.
Note: this parameter is useful to ensure the balancing of the pressure after the compressor stops for systems with hermetic and capillary compressors.
Default: 'c2'=0 => no minimum OFF time is set.

c3: Minimum compressor ON time
Sets the minimum running time for the compressor. The compressor is not stopped until it has been ON for at least the minimum time selected ('c3').
Default: 'c3'=0 => no minimum running time is set.



c4 : Duty setting or relay safety device
If the **"virtual control probe fault"** alarm occurs (see parameter '/4'), this parameter is used to ensure the operation of the compressor while elimination of the fault is awaited.
Important: In the event of errors on probe 2, the virtual probe corresponds to the ambient probe (probe 1) and consequently the Duty Setting ***is not activated***.

In practice, as the compressor is no longer able to operate based according to the temperature (due to the probe fault), it is made to run cyclically with an operating time (**ON time)** equal to the value assigned to parameter 'c4' (in minutes) and a fixed **OFF time** of 15 minutes.

ON time = value (c4)

OFF time = 15 minutes (fixed)

There are two values of 'c4' causing special behaviour::

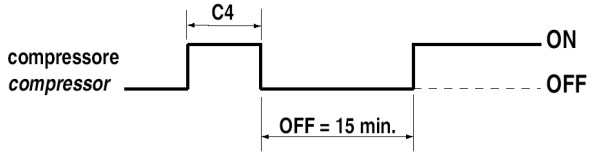
'c4'=0, in the event of faults involving the virtual control probe, the compressor is always OFF;

'c4'=100, the compressor is always ON, that is, the 15 minute OFF time is always ignored.

Special situations:

- If the virtual control probe error occurs while the compressor is OFF, it remains OFF for 15 minutes, and is then started (respecting the times set for parameters 'c1' and 'c2') and remains ON for a time equal to 'c4'. It then starts "duty setting" operation. This special operation is signalled by the ⊖ LED that flashes during the compressor OFF period, and remains on steady when the compressor is operating. The fans continue to operate according the set parameters (see F parameters). If the duty setting requires the immediate shut-down of the compressor for a non-specified time ('c4'= 0), this is done without observing the compressor protection times.
- If the virtual control probe error occurs while the compressor is ON, it remains ON for the time 'c4', and then is stopped (without observing the minimum ON time, if set for parameter 'c3') and remains OFF for 15 minutes (the ⊖ LED flashes in this phase). After this, periodic operation starts, with an operating time equal to the value of 'c4'.

Warning: If the probe error disappears, the unit returns to normal operation;



Default: 'c4'=0 => compressor always Off in the event of a virtual control probe error.

c5 : Continuous cycle duration

This is the time (in hours) during which the compressor operates continuously to lower the temperature, even below the set point.

With 'cc'=0 => the continuous cycle is disabled.

The controller exits the continuous cycle procedure after the time set for parameter 'cc' has elapsed, or upon reaching the minimum specified temperature (see the minimum temperature alarm, parameter 'AL').

Default: 'cc'=0 (hours).

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c6 : Alarm bypass after continuous cycle

This is the time (in hours) for which the temperature alarm is deactivated after a continuous cycle. If the temperature of the refrigeration unit, after the continuous cycle, falls due by inertia below the minimum temperature (set point – 'AL'), the activation of the low temperature alarm is delayed for time 'c6'.

Warning: remember that at the minimum specified temperature (see the minimum temperature alarm, parameter 'AL') the continuous cycle is forced OFF and deactivated.

Default: 'c6'=2 (hours).

c7: Maximum pump down time

This parameter determines, depending on the setting of parameter 'c10', the maximum time in minutes by which the circuit must reach the required low pressure value in pump down operation ('c10'=0), or the compressor operating time after the closing of the pump down valve in case of pump down operation by time ('c10'=1).

The Pump-Down valve must be connected to the auxiliary output, setting the relevant parameter (H1).

If pump down by pressure is selected (c10=0):

When reaching the maximum pump down time, the compressor stops and alarm 'Pd' is activated.

The 'Pd' alarm disables the compressor autostart function (see parameter 'c9') with the pump down valve closed, on the "high pressure" request from the pressure switch.

When the 'Pd' alarm is signalled, the compressor remains OFF until the controller requires cooling.

When reaching the set point, a pump down procedure is run and the alarm is automatically reset if the low pressure is reached within the time 'c7'.

Low pressure is monitored by connecting the low pressure switch to one of the two digital inputs and setting the parameter 'A4', A4 or A5.

If pump down by time is selected (c10=0):

When the compressor operating time 'c7' is reached after the opening of the valve, the compressor is stopped, irrespective of the low pressure reading.

The 'Pd' alarm is deactivated.

In any case, the compressor is stopped when reaching the low pressure.

In this case, autostart in pump down is disabled.

Default: 'c7'=0 => Pump down disabled.

c8 : Compressor start delay after opening of PD valve
This parameter determines after how many seconds from the opening of the pump down valve the compressor starts, and is useful to avoid activating the 'LP' alarm unnecessarily.
The low pressure alarm (LP), with valve open and compressor ON, is activated by the opening of the pressure switch. This alarm entails disabling the compressor and resets automatically.
The parameter is active if 'c7'=0.

Default: 'c8'=5 => 5 seconds delay.

c9 : Enable autostart function with PD operation
If the parameter is set to 0, the system will perform a pump down cycle each time the pump down valve closes.
If the parameter is set to 1, on the other hand, the system will perform a pump down cycle each time the pump down valve closes and on each successive request from the low pressure switch when there is no cooling requirement (autostart situation). The autostart function is disabled if Pd alarms are active or if pump down by time is selected.
The parameter is active if 'c7'=0.
Default: 'c9'=0 => only one pump down cycle is run whenever the pump down valve is closed.

c10: Select pump down by pressure or by time
This parameter determines if the pump down procedure must end following the activation of the low pressure switch, or after a set time. In this case, after the valve closes, the compressor works for time 'c7' or until the low pressure value is reached. When this time has elapsed, the compressor is stopped, irrespective of the status of the low pressure input.
The PD alarm (Pump-down finished by timeout) and the compressor autostart function in Pump-down state, are disabled
Default: 'c10'=0 => Pump down by pressure.

c11 : Second compressor delay
This parameter determines the delay of the second compressor, compared to the main compressor, during start-up, whereas the stop occurs simultaneously.
IMPORTANT: select the auxiliary output as a delayed compressor, using the H1 parameter.
Default: 'c11'=4 => 4 seconds delay.

7.4 Defrost management parameters

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No.	Code	Parameter	MSYF	UOM	Type	Def.	Max	Min
38	d0	Type of defrost	-SYF	flag	C	0	3	0
39	dI	Interval between defrosts	-SYF	hours	F	8	250	0
40	dt1	End defrost temperature, main evap.	-SYF	°C/°F	F	4.0	200	-50
41	dt2	End defrost temperature, aux evap.	-SYF	°C/°F	F	4.0	200	-50
42	dP1	Maximum defrost duration, main evap.	-SYF	min	F	30	250	1
43	dP2	Maximum defrost duration, aux evap.	-SYF	min	F	30	250	1
44	d3	Defrost start delay	-SYF	Min	C	0	250	0
45	d4	Enable defrost on start-up	-SYF	flag	C	0	1	0
46	d5	Defrost delay on start-up	-SYF	min	C	0	250	0
47	d6	Display on hold during defrost	-SYF	-	C	1	2	0
48	dd	Dripping time after defrost	-SYF	min	F	2	15	0
49	d8	Alarm bypass after defrost	-SYF	hours	F	1	15	0
50	d9	Defrost priority over compressor protectors	-SYF	flag	C	0	1	0
51	d/1	Display of defrost probe 1	MSYF	°C/°F	F	-	-	-
52	d/2	Display of defrost probe 2	MSYF	°C/°F	F	-	-	-
53	dC	Time base for defrost	-SYF	flag	C	0	1	0
54	d10	Compressor running time	-SYF	hours	C	0	250	0
55	d11	Running time temperature threshold	-SYF	°C/°F	C	1.0	20	-20
56	d12	Advanced defrost	-SYF	-	C	0	3	0
57	dn	Nominal defrost duration	-SYF	-	C	65	100	1
58	dH	Proportional factor, variat. of 'dI'	-SYF	-	C	50	100	0

Important warning: for the set times to become immediately operational, the instrument needs to be turned off and on again. If this operation is not carried out, timing resumes operation the next time it is used.

d0 : Type of defrost
Establishes, for the instruments fitted with defrost relays, the **type of defrost**:

- d0=0 electric heater defrost by temperature;
- d0=1 hot gas defrost by temperature;
- d0=2 electric heater defrost by time, 'Ed1' and 'Ed2' not displayed;
- d0=3 hot gas defrost by time, 'Ed1' and 'Ed2' not displayed.

Defrost can be effected for all models::

- by temperature, using the defrost probe fitted on the evaporator. In any case, the defrost will be stopped after a maximum set safety time. The alarms 'Ed1' and 'Ed2', "end defrost due to maximum duration" (parameter 'A8') can be disabled;
- by time: without the defrost probe.

Note: model S does not have a defrost relay, and consequently the defrost can only be performed by stopping the compressor and selecting end of defrost by time or temperature.

If the alarms 'Ed1' and 'Ed2' are not disabled, when activated, they can be cancelled by pressing PRG mute and aux together for more than 5 seconds, or automatically at the start of the next defrost operation.
Default: d0=0 electric heater defrost by temperature;

dI: Interval between defrosts
The defrosts are performed cyclically at an interval equal to the value of **'dI'** in hours (or minutes, see parameter 'dC'), counted at end of previous period. The duration of the defrost therefore does not therefore affect the interval between defrosts.
The interval is also maintained when the unit is OFF. If the interval 'dI' expires when the controller is OFF, when it is started again a defrost is performed.
If 'dI'=0 => the defrost is never performed except when forced from the keypad (manual defrost), from the supervisor or from the digital input (see parameter 'A4'), or from the Real Time Clock.

Attention: To ensure regular defrosts, the interval between defrosts must be greater than the maximum defrost duration, plus the dripping time and post-dripping time.

Note: during the defrost, temperature alarms are disabled.
Default: 'dI'=8 hours.

dt1 : SET POINT temperature at end of evaporator defrost
This parameter is used to set the end defrost temperature, measured on the evaporator. In any case, the maximum defrost duration is equal to the value, in minutes, set for parameter 'dP1'.

- If when a defrost is requested, the temperature measured by the defrost probe on the evaporator is greater than the value set for the end defrost, the cycle is not performed (including the dripping and post-dripping phases). The same is true for the defrost on start-up, from digital contact, from RTC and from the keypad.
- If the defrost probe on the evaporator is faulty or disabled, the controller performs a timed defrost, with a duration equal to the value set for parameter 'dP1'.
- If the end defrost set point is not reached within the time set for parameter 'dp1', the defrost is stopped. If enabled (parameter 'A8'), the error 'Ed1' is displayed, which persists until the start of the next defrost cycle.

Default: **'**dt1'=4°C.

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dt2 : End defrost temperature SET POINT, auxiliary evaporator
dt2 acts in the same way as parameter (dt1) described above, but referring to the auxiliary evaporator.
Default: **'**dt2'=4°C.

dP1: Maximum defrost duration, main evaporator
Determines the maximum defrost duration on the evaporator in minutes (or seconds, see parameter 'dC') if defrost by temperature is selected. If timed defrost has been selected, this is the actual duration of the defrost.
Default: dP1= 30 minutes

dP2 : Maximum defrost duration, auxiliary evaporator
It acts identically to the parameter (dP1) described above, but refers to the auxiliary evaporator.
Default: 'dP2'=30 minutes.

d3: Defrost start delay
This parameter determines the time that must elapse, when the defrost is activated, between the stopping of the compressor (electric heater defrost) or the starting of the compressor (hot gas defrost), and the activation of the defrost relays on the main and auxiliary evaporators.
The delay 'd3' is useful, in the hot gas defrost, to ensure a sufficient quantity of hot gas for the defrost before the activation of the cycle reversing valve, in very special applications (see paragraph ".Description of software functions").
Default: 'd3'=0 minutes.

d4 : Defrost when the instrument is switched on
Activates a defrost when the instrument is switched on.
Warning: this request has priority over the activation of the compressor and the continuous cycle.
The possible values are:
'd4'=0, no defrost is performed when the instrument is switched on;
'd4'=1, a defrost is performed when the instrument is switched on.

Starting a defrost when the instrument is switched on may be useful in special situations.
Example: frequent power drops occur in the system, which cause the internal clock to be reset. This clock calculates the interval between two defrosting operations, restarting from zero. If the frequency of the power failure were, in an extreme case, greater than the defrost frequency (e.g. a power failure every 8 hours, against a defrost every 10 hours) the controller would never perform a defrost. In a

situation of this type, it is preferable to enable defrost on start-up, above all if the defrost is controlled by temperature (probe on the evaporator), therefore avoiding unnecessary defrosts or at least reducing the running times.
In the case of systems with a large number of units, if you select defrosts at start-up, after a power failure all the units will start defrosting, thus causing a voltage overload. To overcome this, the parameter 'd5' can be used. It adds a delay before the defrost, and this delay must obviously be different for each unit.

Default: 'd4'=0 the instrument does not perform a defrost on start-up.

d5: Defrost delay when the instrument is switched on or from multifunction input
The time that must elapse between start-up of the controller and the start of the defrost.

- If the digital input is used to enable the defrost (see parameter 'A4'=3) or to start a defrost from external contact (see parameter 'A4'=4), the parameter 'd5' refers to the delay between enabling of the defrost or request to enable, and the effective start.
- The defrost digital input (see parameter 'A4') can be usefully employed to perform defrosts in real time, connecting a timer to the input.. The defrost will be activated when the timer contact closes.
- **If several units are connected to the same timer, parameter 'd5' should be used to delay the various defrosts, thus avoiding power overloads. In addition, to avoid unwanted defrosts started by the clock inside the instrument, set parameter 'dI'=0 (manual defrosts only, started from the keypad, by the RTC, by the calculation of the compressor running time or by the Multifunction contact).**

Important warning: when connecting a series of units to the same timer, the best solution is to insulate all the contacts galvanically, fitting intermediate relays for each contact.
Default: 'd5'=0 => no delayed defrost when switching the instrument on or following the activation of the multifunction input.

d6 : Display during defrost
Specified values :

- 'd6'=0 => during the defrost the instrument displays the text 'dEF' alternating with the value read by the probe selected using parameter '/tI'. This is to signal that any high temperature values are due to the defrost procedure in progress.
- 'd6'=1 => during the defrost the last temperature shown before the start of the cycle remains on the display. The display returns to normal when the control temperature reaches the set point, the temperature to be displayed is less than the value locked on the display or, in any case, after the time set for the "alarm bypass after defrosting" ('d8').
- 'd6'=2 => during the defrost the instrument displays the text 'dEF' steady on the display.

Note: in OFF and REVERSE modes, the display is unlocked after the defrost.

Default: 'd6'=1 => during the defrost the last temperature read before the start of the cycle remains on the display.

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dd : Dripping time
This parameter is used to stop (in minutes) the compressor and the evaporator fans after a defrost to facilitate evaporator dripping,
If 'dd'=0 => there is no dripping time, therefore, at the end of the defrost the control functions start immediately .
Default: 'dd'=2 minutes.

d8 : Alarm bypass time after defrost and/or door open
Indicates the time (in hours) that the high temperature alarm signal is ignored from after the end of a defrost cycle or from when the door to the cold room is opened, if the Multifunction input is connected to the "door switch" (see parameters 'A4' and 'A5').
Default: 'd8'=1 hour bypass.

d9: Defrost priority over compressor protective devices
Ignores the compressor protection times at the start of the defrost. Compressor protection times:

- c1: minimum time between 2 successive starts;
- c2 : minimum OFF time;
- c3: minimum operating time.

'd9' = 0 the protection times are respected
'd9' = 1 the protection times are not respected. Therefore, defrost has higher priority and the compressor times are ignored.

In the hot gas defrost, this is useful to avoid delaying the start of the defrost if the compressor has just stopped and there is a minimum time between two starts of the compressor. Remember, however, that in this event the maximum number of compressor starts per hour may not necessarily be respected.

Warning: if the defrost requires the activation of the compressor (hot gas defrost) and parameter 'd9'=1, the compressor may risk being damaged due to an excessive number of close starts.
Default: 'd9'=0 => the defrost respects the compressor times (however by default these are set to zero).

d/1: Defrost probe 1 reading
This parameter is used to display the value measured by defrost probe 1 (in the instruments where this is fitted). When you have selected parameter 'd/1', pressing the SET key displays the temperature measured by defrost probe 1.
If defrost probe 1 is disabled, three horizontal dashes '___' will be displayed.

d/2: Defrost probe 2 reading
It operates identically to the parameter (d/1) described above, but refers to defrost probe 2.

dC : Time base
Used to modify the measurement unit used to count the times set for parameters 'dI' (defrost interval), 'dP1' and 'dP2' (defrost duration)..
'dC'=0 =>'dI' expressed in hours, 'dP1' and 'dP2' in minutes.
'dC'=1 =>'dI' expressed in hours, 'dP1' and 'dP2' in minutes.
The parameter 'dC'=1 can be used to test defrost operation at shorter times. In addition, it is useful for using the instrument to manage air driers. The defrost cycle then becomes the condensate discharge cycle, which must be performed at close intervals (minutes) and for short durations (seconds).
Default: 'dC'=0 =>'dI' expressed in hours, 'dP1' and 'dP2' in minutes.

d10: Compressor running time
This parameter indicates the compressor operating time in hours, with the temperature below the threshold indicated by the parameter 'd11', after which a defrost request is generated.
Setting 'd10'=0 disables the function.
Default: 'd10'=0 => Function disabled.

d11: Running time temperature threshold
This parameter indicates the evaporation temperature below which the compressor must continue to operate for the time 'd10' in order to generate a defrost request.
Default: 'd11'=1 => 1°C.

d12: Advanced auto-adapting defrosts
This parameter is used to enable and disable the advanced defrost function, as per the following table:

d12	Skip Defrost	Automatic variation of dI
0	Disabled	Disabled
1	Disabled	Enabled
2	Enabled	Disabled
3	Enabled	Enabled

Default: 'd12'=0 => Both the functions are disabled.

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dn: Nominal defrost duration
This indicates the average duration of the defrost in normal operating conditions. It is expressed as a percentage, with reference to parameters 'dP1' and 'dP2', according to the following formulas:

$$dn1 = \frac{dn}{100} dP1$$

$$dn2 = \frac{dn}{100} dP2$$

Example: with 'dn'=65, 'dP1'=90 min. and 'dP2'=120 min.
Nominal defrost duration on main evaporator: 59 min.
Nominal defrost duration on auxiliary evaporator: 78 min.
Default: 'dn'=65 => 65% of 'dP1' or 'dP2'

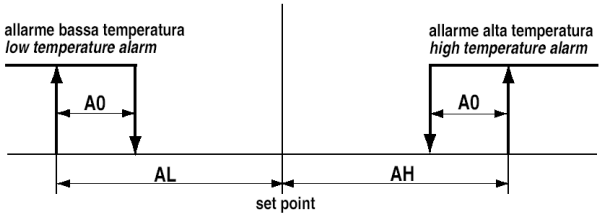
dH: Proportional factor in the variation of the defrost interval
This parameter is used to increase or decrease the influence of the effective duration of the defrost, in relation to the nominal duration, in the algorithm that manages the automatic variation of the defrost interval.
By setting 'dH'=0, the effective duration has no influence on the duration of the defrost interval. Vice versa, with dH = 100, one obtains maximum efficiency.
Default: dH=50

7.5 Alarm management parameters

No.	Code	Parameter	MSYF	UOM	Type	Def.	Max	Min
59	A0	Alarm and fan differential	MSYF	°C/°F	C	2.0	20	0.1
60	A1	Type of threshold 'AL' and 'AH'	MSYF	flag	C	0	1	0
61	AL	Low temperature alarm threshold	MSYF	°C/°F	F	0.0	200	-50
62	AH	High temperature alarm threshold	MSYF	°C/°F	F	0.0	200	-50
63	Ad	Low and high temperature alarm delay	MSYF	min	F	120	250	0
64	A4	Digital input 1 configuration	-SYF	-	C	0	12	0
			M---	-	C	3	12	0
65	A5	Digital input 2 configuration	MSYF	-	C	0	12	0
66	A6	Stop compressor from external alarm	-SYF	min	C	0	100	0
67	A7	External alarm detection delay	-SYF	min	C	0	250	0
68	A8	Enable alarms 'Ed1' and 'Ed2'	-SYF	flag	C	0	1	0
69	Ado	Light management mode with door switch	MSYF	flag	C	0	1	0
70	Ac	High condenser temperature alarm	-SYF	°C/°F	C	70.0	200	0.0
71	AE	High condens. temperature alarm differential	-SYF	°C/°F	C	5.0	20	0.1
72	Acd	High condenser temperature alarm delay	-SYF	min	C	0	250	0
73	AF	Light sensor OFF time	-SYF	sec	C	0	250	0

Important warning: for the set times to become immediately operational, the instrument needs to be turned off and on again. If this operation is not carried out, timing resumes operation the next time it is used.

A0 : Alarm and fan differential



This is the differential used for disabling high and low temperature alarms ('AL' and 'AH') (see the figure shown below) and for managing the fans (see the F parameters). In the event of an alarm, as can be seen from the figure, the value of 'A0' in part determine the effective activation points of the temperature alarms.

Default: 'A0'=2.0 degrees.

Preliminary version

A1 : Type of threshold 'AL' and 'AH'

Used for selection, if the values of parameters 'AL' and 'AH' are considered absolute thresholds or relative with respect to the value of the set point.
'A1' = 0 => 'AL' and 'AH' are considered as thresholds relative with respect to the value of the set point.
'A1' = 1 => 'AL' and 'AH' are considered absolute thresholds.
Default: 'A1' = 0 => 'AL' and 'AH' are considered relative thresholds.

AL : Minimum temperature alarm

Used to determine the activation threshold for the low temperature alarm.
Relative threshold for low temperature alarm = (set point) - (value of 'AL'): AL=0=> Alarm disabled;
Absolute threshold for low temperature alarm = value of AL: 'AL' = -50 =>Alarm disabled.

Attention: If the threshold 'AL' is selected as **relative,** the value for disabling the alarm is **0**, if the threshold 'AL' is selected as **absolute**, the alarm disabling value is **–50**.

Warnings for the relative threshold:

- the value of 'AL' does not indicate the alarm temperature, but the maximum permissible deviation off the set point;

changing the set point automatically changes the low temperature alarm, while the maximum deviation allowed (='AL') remains fixed;

Warnings:

- the low temperature alarm has automatic reset. this means that if the temperature returns above the minimum specified value, the alarm signal is automatically cancelled.

Warnings for using the continuous cycle:

- the low temperature alarm is also used in the continuous cycle (see the description of parameter 'cc'). In fact, if the temperature falls to the alarm level, the continuous cycle is stopped automatically, even if the selected time has not yet elapsed. This deactivation, however, does not involve an alarm signal.

Warnings:

- for the control probe alarm, the low temperature alarm is reset and monitoring reinitialised.

Default: 'AL' =0 => low temperature alarm disabled.

AH: High temperature alarm

Used to determine the activation threshold for the high temperature alarm.
Relative threshold for high temperature alarm = (set point) + (value of 'AH'): 'AH'=0 =>Alarm disabled;
Absolute threshold for high temperature alarm = value of 'AH': 'AH'= 200 =>Alarm disabled.

Attention: If the threshold 'AH' is selected as **relative,** the value for disabling the alarm is **0**, if the threshold 'AH' is selected as **absolute**, the alarm disabling value is **200**.

Warnings for the relative threshold:

- the value of 'AL' does not indicate the alarm temperature, but the maximum permissible deviation off the set point (or working point);
- changing the set point automatically changes the high temperature alarm, while the maximum deviation allowed remains fixed;

Warnings:

- the high temperature alarm has automatic reset.
- for the control probe alarm, the high temperature alarm is reset and monitoring reinitialised.

Default: 'AH'=0 => high temperature alarm disabled.

Ad: Temperature alarm delay

Indicates after how many minutes the temperature alarm is signalled when the temperature threshold is exceeded.

Warnings:

- Setting a delay for signalling the temperature alarm may help eliminate false alarms due to interference on the probe signal or brief situations (for example, the door to the cold room opened for a short period);
- No temperature alarms are generated during the defrost and continuous cycle procedures.
- The temperature alarm is delayed by the time 'd8' after the defrost and by the time 'c6' after the continuous cycle. At the end of these two times, the temperature alarm, if detected, is signalled without waiting for the time set for 'Ad'. If times 'd8' and 'c6' are set on zero, the temperature alarm is signalled after the time 'Ad'.

As already indicated by the default value for parameters 'AL' and 'AH', the instruments are programmed at our factory as default with the relevant thresholds, and the high and low temperature alarms are disabled. The alarms, when enabled, activate the buzzer, if enabled, and show a code on the display: **'HI'** for the high temperature and **'LO'** for the low temperature alarm. The following conditions generate the temperature alarms:

- **high temperature alarm:** the temperature measured by the virtual control probe is above the threshold set for parameter 'AH';
- **low temperature alarm:** the temperature measured by the virtual control probe is below the threshold set for parameter 'AL' .

Default: 'Ad'=120 => 120 delay, in minutes, with respect to the signalling of the temperature alarms.

A4 : Multifunction digital input configuration

In the ir33 series, this parameter and the model of controller used, define the meaning of the multifunction digital input. The possibilities are described below:

Preliminary version

A4=0 Input not active

The multifunction digital input is not used and is the factory-specified configuration for all versions.

A4=1 Immediate external alarm

The digital input can be connected to an external alarm that requires immediate activation (for example, high pressure alarm or compressor thermal overload).
Specifically, the alarm is detected when the contact opens (normal operation with contact closed).
The activation of the alarm:

- shows the message on the display ('IA');
- activates the buzzer, if enabled;
- activates the alarm relay, if selected;
- involves the following actions on the actuators:
  - compressor: operates depending on the values assigned to parameter 'A6' (stop compressor from external alarm).
  - fans: continue to operate according to the fan parameters ('F').

When stopping the compressor, the minimum ON time ('c3') is ignored. When the alarm stops, the defrost and the continuous cycle can be performed again, and the compressor returns to normal operation.

Important warning: remember that in order to ensure the safety of the unit in the event of serious alarms, all the electromechanical safety devices required to guarantee correct operation must be fitted on the unit.

A4=2 Delayed external alarm

The delayed external alarm is equivalent to the immediate external alarm ('A4=1'), except that this alarm is signalled after the time 'A7' from when it is detected. This configuration is especially useful for managing the low pressure alarm. In fact, when starting for the first time, the unit often detects a low pressure alarm due to the environmental conditions rather than the malfunctioning of the unit. **Setting a delay for the alarm will avoid false signals.** In fact, by suitably calculating the delay, if the low pressure is due to environmental conditions (low temperature), the alarm will be automatically reset before the delay has elapsed.

Note: if more than one digital input is configured as an immediate or delayed alarm, the alarm is generated when at least one of the inputs is open.

A4=3 The meaning varies according to the model used:

Version ir33M = probe selection
This is used to exploit the digital input in order to show, on the display, the probe selected by parameter /tI or the first enabled probe (see parameters /A2, /A3, /A4, /A5). In practice, if the contact is open, the probe selected by parameter /tl is shown, whereas, if the contact is closed, the first enabled probe is shown.

Default: A4=3 digital input for probe selection

Note: if more than one digital input is configured as a probe selection, the probe selected by parameter /tl is displayed when at least one of the inputs is open.

- For all other models = Defrost enabling
An external contact can be connected to the multifunction input to enable or inhibit the defrost.

- Contact open:
  - the defrost is inhibited.
- Contact closed:
  - the defrost is enabled.
- Contact closed without request from the controller:
  - the defrost is not performed.
- Contact closed and defrost in progress:
  - when the digital input is opened, the defrost is immediately stopped and the unit restarts normal operation (without performing the dripping or post-dripping phased). The ❄ LED starts flashing to indicate that the defrost request is pending, awaiting the next enabling signal (closing of the contact), when the defrost will be performed completely.

Suggestion: this function is useful, for example, in the event of:

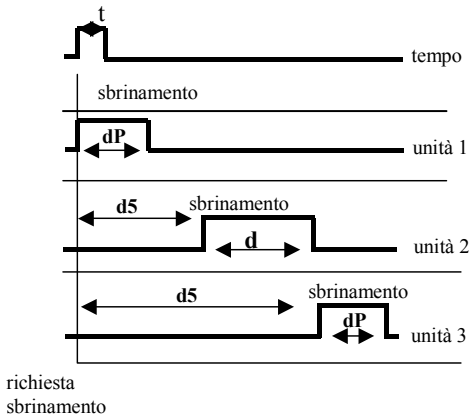
- multiplexed showcases with hot gas defrost. In these systems, defrosts must be performed by "islands", and therefore, at any one time, some islands are enabled to be defrosted, while others are inhibited;
- prevent defrosts on the units accessible by the public during opening times. Any defrost request arriving when the contact is open will remain pending until the contact closes.

Note: if more than one digital input is configured to enable the defrost, the defrost will be disabled when at least one of the inputs is open.

Preliminary version

A4=4 Start defrost from external contact
This function used to start the defrost from an external contact. If 'dI'=0 is set and no defrost enabling signal related to the clock is set, the defrost can only be performed on start-up, by the digital input, by the supervisor and from the keypad. This function is useful to run real time defrosts. To perform the defrosts, connect a cyclic, mechanical or electronic timer to the digital input: When the contact of the timer closes, the defrost request is sent. As in the description of parameter 'd5', a series of units can be connected to the same timer.

Important warning for versions operating on 12Vac and 12-24Vac: when connecting a series of units to the same timer, the best solution is to insulate all the contacts galvanically, inserting an intermediate relay for each contact.
Setting a different value for 'd5' on each unit will avoid simultaneous defrosts.



Key:
t = impulse from the timer to start the defrost: the minimum duration allowed is 0.5 seconds
dP (1) = maximum defrost duration, unit 1;
d5 (2) = defrost delay from external contact for unit 2; this must be greater than dP (1), to avoid overlapping of defrosts.
Similarly for d5 (3) and dP (3).

Note: if more than one digital input is configured to start the defrost, the defrost is started when at least one of the inputs closes.

A4=5 Door switch with compressor and fan stop

Setting A4=5 manages the cold room door switch. **The behaviour of the door switch depends on whether the door is opened with the light OFF or light ON.** The need to differentiate the two operating modes is mainly designed for controlling display cases and cold rooms.

Case 1: door opened with light OFF.
If the door is opened with the light OFF:

- the compressor and evaporator fans are switched off (to stop the fans only, set parameter A4=9);
- the light is switched on (only in the models fitted with at least 1 auxiliary relay programmed as the Light output);
- the reading displayed and the ⚠ icon flash;
- the temperature alarms are disabled.

If the door remains open for longer than time 'd8', the controller restarts normal operation:

- compressor and fan ON, if requested;
- light ON (the auxiliary relay is selected as the Light);
- the reading flashes;
- the buzzer and the alarm relay are activated;
- the temperature alarms are enabled.

To stop the reading from flashing, close the door. When the door is closed, the controller returns to normal operation, switching off the light and enabling the temperature alarm after the delay time d8. The compressor is re-started respecting any protection times selected (see the 'c' parameters).

Case 2: door opened with light ON.
Assuming the user enters the cold room, turning on the light before entering, closing the door behind him, and then exits the room, closing the door a second time.
When the door is opened:

- the compressor the evaporator fans are switched off (to stop the fans only, set parameter A4=9);
- the light is switched on (only in the models fitted with an auxiliary relay programmed as the Light output);
- the reading displayed and the ⚠ icon flash;
- the temperature alarms are disabled.

When the door is closed the first time, the controller maintains the previous situation:

When the door is closed the second time, the controller returns to normal operation, switching off the light and enabling the temperature alarm after the delay time d8. The compressor is re-started respecting any protection times selected (see the 'c' parameters).
If, after opening, the door remains open for a time longer than 'd8', the controller returns to normal operation:

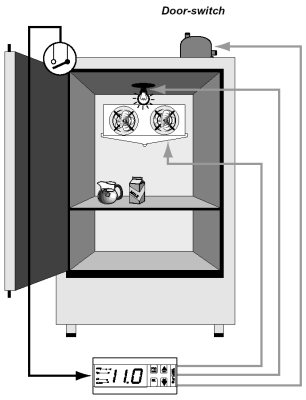
- compressor and fan ON, if requested;
- light OFF;
- the reading flashes;
- the buzzer and the alarm relay are activated;
- the temperature alarms are enabled.

To stop the reading from flashing, close the door.

If, after being closed for the first time, the door remains closed for longer than time 'd8', or if the light is switched off manually, the controller restarts normal operation:

- compressor and fan ON, if requested;
- light OFF;
- the temperature alarms are enabled.

Preliminary version



Note: If the light was previously switched on manually, when the door is closed for the second time, it is automatically switched off.
Warning: even when the fan is managed by the fan controller (see the family of 'F' parameters), the fans are forced to stop when the door is open.

This algorithm resolves any problems relating to faults or malfunctions of the "door switch".

Note: if more than one digital input is configured as the door switch, the door open status occurs when at least one of the inputs is open.

A4=6 Remote ON/OFF

The digital input can also be programmed as a remote ON/OFF switch. When the contact is closed, the controller is ON.
When the controller is OFF:

- The temperature is displayed alternating with the message 'OFF';
- The internal timer for parameter 'dI' is updated. If 'dI' expires when the unit is OFF, a defrost is performed when the unit is switched on again;
- the auxiliary relays set to AUX and LIGHT remains active;
- the buzzer and the alarm relay are de-activated;
- The controller does not perform adjustment, defrosts, continuous cycle, signalling the temperature alarm and all other functions.
- The compressor protection times are observed;

When the instrument is switched back on, all the functions are re-activated, with the exception of:

- defrost on start-up;
- Compressor and fan delay on start-up;

Contact closed => ON.
The ON/OFF from external digital input has priority over the keypad and the supervisor.
If 'A4'=6 , 'A5'=6, the controller is ON with all the contacts closed.
Note: if more than one digital input is configured as the remote ON/OFF, the OFF status occurs when at least one of the inputs is open.

A4=7 Curtain switch

If the input is selected as a curtain switch, the controller modifies the set point when the contact closes, adding the value of parameter 'r4'; the new value is then used for all the functions relating to the set point (e.g. relative high and low temperature alarms, etc.).
When 'r4'=3.0 (pre-programmed value), the set point is increased by 3 degrees from the value used when the curtain is open.

Contact closed => curtain lowered.
If one of the auxiliary outputs is used to manage the light, lowering the curtain automatically switches the light off, while raising it switches the light on.
Note: if more than one digital input is configured as a curtain switch, the curtain open status occurs when at least one of the inputs is open.

preliminary version

A4=8 Low pressure switch input for pump down

Set 'A4'=8 to mange the low pressure switch.
The low pressure alarm 'LP' is signalled when the pressure switch signals a low pressure situation with the pump down valve open and the compressor on, if the pump down function is active, or when the compressor is on. The low pressure alarm signal is nonetheless delayed by the time in minutes set for parameter 'A7'.
This parameter, together with parameters 'C7', 'C8', 'C9' and 'H1', allows management of the **"pump down" algorithm.**
Contact open => low pressure.

Important: If 'c7'=0 (pump down disabled), the low pressure situation can still be detected.
Note: if more than one digital input is configured as the low pressure switch input, the low pressure alarm is activated when at least one of the inputs is open.

A4=9 Door switch with fan stop only

Same as for option 'A4'=5, with the difference that when opening the door, only the fans are stopped, rather than the compressor and the fans.
Note: if more than one digital input is configured as the door switch, the door open status occurs when at least one of the inputs is open.

A4=10 Direct/Reverse operation

The digital input is used to select Direct operation (for refrigeration), with open contact, or Reverse operation (for heating), with closed contact.
A switch can therefore be connected to select, heating or cooling operation, according to position. .
Depending on the value of parameter 'r3', the following configurations are possible:

with 'r3'=0:

- Contact open = Direct operation with defrost control;
- Contact closed = Reverse operation.

with 'r3'=1 or 'r3'=2

- Contact open = Direct operation;
- Contact closed = Reverse operation.

Warning: if 'A4'=10, the status of the digital input has priority over the parameter 'r3', that is, the value assigned to parameter 'r3' is ignored and only the status (open or closed) of the digital input is considered.

Notes:
1) if more than one digital input is configured for direct/reverse operation. The direct mode status occurs when at least one of the inputs is open.
2) the status of the digital input selected for direct and reverse mode control has priority over the operating mode set using parameter 'r3'.

A4=11 Light sensor
The digital input is used to read a light sensor (actually an analogue input, from which a digital signal is taken using the parameter or threshold of the light sensor).
The light sensor may be located:
- in the door stop,
- inside the cold room or cabinet.

In the first case, the sensor signals the opening and the closing of the door, because, with the door open, light is signalled, and with the door closed, dark is signalled (the sensor is located in the door stop and thus will be shadowed when the door is closed).
The inside light will be automatically switched on when the door is open and switched off when the door is closed.
The light stays OFF for a minimum time of 5s, to avoid rapid, successive impulses of the light relay.
To select this operating mode, set AF=0.

In the second case, the light sensor signals the opening of the door of the cold room or the cabinet due to the outside light that the sensor detects, thus activating the internal light. The closing of the door is measured by time, as the light inside the cold room or cabinet will illuminate the sensor. After time AF (greater than 0), the inside light is switched off for 5 seconds. If the light sensor signals darkness, the door must be closed and the light will therefore remain OFF. Otherwise, the door stays open and the light is re-lighted. To select this operating mode, set AF>0

A4=12 Activation of the AUX output
The digital input is used to activate/deactivate the AUX output, if configured with parameters 'H1', with the following logic .

Digital input	**AUX output**
Opening	deactivation
Closing	activation

The output is activated/deactivated on closing/opening the contact, to make this operating mode compatible with the presence of the AUX button and the control signal from the supervisor.

Preliminary version

Note: if more than one digital input is configured to activate the AUX output, the open status is true when at least one of the inputs is open.

The table below summarises the functions of the digital input corresponding to the value assigned to the variable 'A4'.

Value of 'A4'	**Meaning**	**Operation**
0	input not active	
1	immediate external alarm	Contact open = alarm active.
2	delayed external alarm	Contact open = alarm active. Delay: see parameter 'A7'.
3	**for the other models:** Enable defrosts.	**for the other models:** Contact closed => Defrosts enabled.
4	start defrost	The defrost is enabled when the contact closes. This can be used for real time defrosts.
5	door switch with compressor and fan stop	Contact open = door open. When the door is opened the compressor and the fans are switched off.
6	remote ON/OFF	Contact closed = On. If 'A4'=6 and 'A5'=6, the controller is On with both the contacts closed.
7	curtain switch	Contact closed = Curtain lowered. If the input is selected as a curtain switch, the controller modifies the set point when the contact closes, adding the value of parameter 'r4'.
8	low pressure switch input for pump down	Contact open => low pressure.
9	door switch with fan stop only	Contact open = door open. When the door is opened the fans are switched off.
10	Direct/Reverse operation	Contact open = Direct operation;
11	Light sensor	Above the threshold = off Below the threshold – hysteresis = off
12	Activation of AUX output	Opening = deactivation Closing = activation

Value of 'A4'	Function	Function active	LED ⚠ on
0	input not active		
1	immediate external alarm	open = alarm	open
2	delayed external alarm	open = alarm	open
3 model M	select probes	open = probe selected by parameter /tI closed = first probe enabled	
3 other models	enable defrost	closed= enabled	
4	start defrost	closing = defrost request	
5	door switch with compressor and fans OFF	open = door open	
6	remote ON/OFF	open = instrument OFF	
7	curtain switch	closed = curtain closed	
8	low pressure switch	open = low pressure	
9	door switch with fans OFF only	open = door open	
10	direct / reverse	open = direct	
11	light sensor	above the threshold = off	
12	activation of AUX output	opening = deactivation	

Default: A4=0 => Digital input not active (for all other models).

A5 : Configuration of the second multifunction digital input.
For this parameter the same description relating to parameter 'A4' is valid, obviously referring to the second digital input.
Default: 'A5'=0 => Digital input not active.

A6 : Stop compressor from external alarm
The meaning of this parameter is similar to that of parameter 'c4' (duty-setting).
If an external alarm occurs (immediate or delayed), the compressor works for a time equal to the value set for parameter 'A6' (in minutes), while it remains OFF for a fixed period of 15 minutes.

Special cases:

'A6'=0 the compressor is always OFF;
'A6'=100 the compressor is always ON.

The fans continue to be managed according to the set parameters (see category 'F'). If duty-setting for the probe alarm (parameter 'c4') is also active, the controller uses the value of A6.

Default: 'A6'=0 => compressor OFF in the event of external alarms.

Preliminary version

A7 : Delay in detecting the external alarm (Multifunction input)
Establishes the delay (in minutes) in detecting an external alarm, if selected as a delayed external alarm (A4 , A5=2) or the signal of the low pressure (LP) alarm, if selected as a pressure switch input for low pressure (A4 , A5=8).
Default: A7=0.

A8 : Enable signals Ed1 and Ed2
The alarms 'Ed1' and 'Ed2' signal the end of the defrost due to "maximum duration of the defrost time".
These can, however, be disabled by setting 'A8'=0.

The alarms 'Ed1' and 'Ed2', if enabled, are cancelled at the start of the following defrost or can be reset manually by pressing the PRG mute and ▲ aux buttons for more than 5 seconds.

Default: 'A8'=0 => alarms 'Ed1' and 'Ed2' disabled.

Ado : Configuration of the third multifunction digital input
This parameter is used to select the algorithm for managing the door.

Ado	Light on opening the door	Algorithm	Description
0	off	normal	opening-closing
	on	extended	opening-closing-opening-closing
1	off	extended	opening-closing-opening-closing
	on	normal	opening-closing

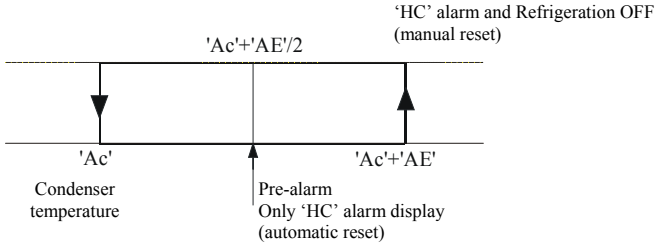
Default: 'Ado'=0 => Normal algorithm.

Ac : Condenser high temperature alarm

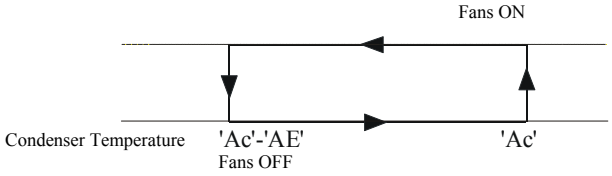
If a probe is set as the condenser probe, the condenser temperature can be monitored to signal the high temperature alarm, probably due to obstruction or fouling..

If the condenser temperature is >‘Ac’+ (‘AE’/2), the pre-alarm is signalled, displaying the alarm message ‘cht’. If in the pre-alarm situation, the condenser temperature falls to <‘Ac’, the pre-alarm is reset and the signal ‘cht’ disappears;

If the condenser temperature increases >‘Ac’ + ‘AE’, the alarm ‘CHt’ is activated and the compressor is stopped. The alarm can only be reset manually.



In addition, the auxiliary relay can be set as a condenser fan output (see parameters H1’), controlled according to the following diagram:



In case of an error to the condensation probe, the alarm and pre-alarm are activated, and also the condensation fans output, if selected.
Important: if no condenser probe is selected, the condensing temperature alarm and pre-alarm are disabled and the condenser fan output, if selected, is activated.
Default: ‘Ac’=70.0 degrees.

AE : High condenser temperature alarm differential

This is the differential used for activation of the high condenser temperature alarm and control of the condenser fans.
Default: ‘AE’=5.0.

Preliminary version

Acd : Condenser high temperature alarm delay
The parameter ‘Acd’ can be used to set a delay on the activation of the condenser high temperature alarm. When the threshold ‘Ac’ + ‘AE’ is exceeded, the alarm delay timer is started. If, when the delay time ‘Acd’ has elapsed, the temperature is still above the threshold, the alarm ‘CHt’ is activated. Otherwise, if the temperature returns below the threshold, the timer is reset and the alarm ‘CHt’ is not displayed.
Default: ‘Acd’=0 => 0 minutes.

AF : Light sensor OFF time
Used to manage the light sensor, connected to a digital input, as:

AF = 0	sensor in the door stop
AF > 0	sensor inside the cold room or cabinet

When AF=0 the inside light is switched on when the sensor detects light, and is switched off when the sensor detects darkness. The light is switched off for a minimum of 3 seconds, so as to avoid close successive impulses of the light relay.

Note: the sensor must be positioned so as to detect darkness when the door is closed.

When AF>0, the inside light is switched on when the sensor detects light. After a time in seconds equal to AF, the light is switched off for 5 seconds to check if the door has been closed. If darkness is detected, the inside light remains OFF, but if light is detected, the inside light is switched back on (after a minimum time of 3 seconds) and the same cycle starts again.

Default: AF = 0

7.6 Evaporator fan management parameters

No.	Code	Parameter	MSYF	UOM	Type	Def.	Max	Min
74	F0	Fan management	---F	flag	C	0	2	0
75	F1	Fan start temperature	---F	°C/°F	F	5.0	200	-50
76	F2	Fan OFF with compressor OFF	---F	flag	C	1	1	0
77	F3	Fans in defrost	---F	flag	C	1	1	0
78	Fd	Fan OFF after dripping	---F	min	F	1	15	0
79	F4	Condenser fan switch-OFF temperature	MSYF	°C/°F	C	40	200	-50
80	F5	Condenser fan switch-ON differential	MSYF	°C/°F	C	5.0	20	0.1

Under normal operation, infrared series controllers manage the evaporator fans in the following modes:

- always ON;
- ON only when the compressor is ON;
- ON according to evaporator and room temperature.

F0 : Fan management

The fans can be managed by the "fan controller", which controls them according to the temperature measured by the defrost and virtual control probes.
Otherwise, the fans can be left ON always
They can be stopped in the following situations:

- when the compressor is OFF (see parameter 'F2');
- during defrosts (see parameter 'F3');
- during the dripping period (see parameter 'dd');
- and for a further post-dripping period (see parameter 'Fd').

They can be forced ON in the following situations:

- during defrosts (see parameter 'F3');

The following values are allowed for this parameter:

'F0'=0 fans always ON;
'F0'=1 fans controlled according to the temperature difference between the virtual control probe and the evaporator temperature;
'F0'=2 fans thermostat controlled according to the evaporator temperature.

Warning: remember that if a dripping period is set ('dd'=0), the fans are nevertheless stopped irrespective of the value of 'F0'.

Default: 'F0'=0 => fans always ON, not managed by the "fan controller".

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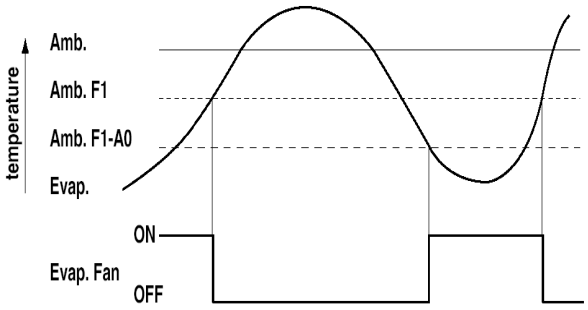
F1 : Fan start temperature (parameter valid only if 'F0'=1 or 'F0'=2)

When 'F0=1', parameter F1 indicates the minimum difference between room temperature and evaporator temperature for the fans to be started. Therefore:

- evaporator temperature < (virtual probe – 'F1'-'A0'), the fans are ON;
- evaporator temperature > (virtual probe – 'F1'), the fans are OFF.

When stopped, the fans can start again when the difference between the two probes is equal to 'F1'+'A0', where 'A0' is the "fan controller" differential (see the following figure).



When 'F0'=2, parameter 'F1' indicates the absolute temperature for starting the fans.
When 'F0'=2

- evaporator temperature < ('F1'-'A0'), the fans are ON;
- evaporator temperature > ('F1'), the fans are OFF.

Notes:

- in the event of two evaporators and therefore two evaporator probes, control will be performed using the maximum value read by the two probes, to ensure that the fans are started when both evaporators reach the set temperature.
- in the event of errors on the control probes, the fans are always on.

Default: 'F1'=5 => as shown in the figure, the fans remain ON while the evaporator is 5 degrees colder than the room temperature.

F2 : Fans OFF with compressor OFF (according to the value of 'F0')
This enables you to decide if the fans must operate according to the contents of parameter F0 (with the exception of the defrost cycle, parameters F3, dd and Fd are displayed) or when the compressor is active.

- 'F2'=0 => the fans are always ON ('F0'=0) or when requested by the fan controller ('F0'=1,2), even when the compressor is OFF;
- 'F2'=1 => the fans are OFF when the compressor is OFF.

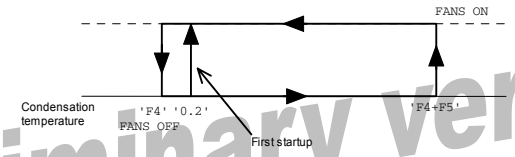
Default: 'F2'=1 => fans OFF with compressor OFF.

F3 : Fans in defrost
This is used to decide if the fans should operate or not during the defrosts.

'F3'=0 => the fans operate during defrosts;
'F3'=1 => the fans do not operate during defrosts.
Remember that during the dripping time and post-dripping time, if specified, the fans are always OFF.
Default: 'F3'=1 => evaporator fans OFF during the defrost.

Fd : Fans OFF for post-dripping
The fans, after defrosting, can be stopped for a further period beyond 'dd' (in minutes), defined by the value of 'Fd'. This is useful to allow the evaporator to return to its operating temperature after defrosting, thus avoiding forcing "hot" air into the refrigerated environment. In the event of management by fan controller, the time 'Fd' does not need to be set, as the controller starts the fans again when the evaporator reaches its operating temperature. If the "fan controller" is active (F0!=0), when assigning to 'Fd' a value other than zero, the fans remain OFF for a time equal to the value of 'Fd', irrespective of evaporator temperature.
Default: Fd=1 => 1 minute post-dripping stop.

F4 : Condenser fan switch-OFF temperature
For selecting the temperature at which the condenser fans should be switched OFF.
If you set the auxiliary relay as the condenser fan output (see parameter H1), this will enable adjustments according to the following diagram:



Preliminary version

At first power-up of the compressor, the fans are switched ON at F4 + 0.2 degrees to compensate for rapid temperature increases that are not easy to follow by the probe. This Set point is activated (F4 + 0.2) solely after the first compressor power-up. Then the adjustment is effected normally, i.e:

power-up : F4 + F5
Power-down: F4

In the event of condenser probe errors, the condenser fan output, if selected, is activated.

Important: If no condensation probe is selected, the condenser fan output, if selected, is disabled.
Default: F4=40.0 degrees.

F5 : Condenser fan switch-ON differential
This is the differential used for adjusting the condensation fans.
Default: F5=5.0

7.7 General configuration parameters

No.	Code	Parameter	MSYF	UOM	Type	Def.	Max	Min
81	H0	Serial address	MSYF	-	C	1	207	0
82	H1	Function of relay 4	MSYF	flag	C	1	10	0
83	H2	Disable keypad/IR	MSYF	flag	C	1	6	1
84	H3	Remote control enabling code	MSYF	-	C	0	255	0
85	H4	Disable buzzer	MSYF	flag	C	0	1	0
86	H6	Lock keypad	MSYF	-	C	0	255	0
87	H8	Selection of activation output with time band	MSYF	flag	C	0	1	0
88	HPr	Print profile	MSYF	-	C	0	15	0

H0: Serial address
This is used to assign to the instrument an address it responds to when connected to a supervisory or telemaintenance system. Also valid for serial connection or network connection.
Default: H0=1

H1 : Operating mode: logic output AUX1 (relay 4)
This establishes whether the fourth relay is used as an auxiliary output (e.g. demister fan or other ON/OFF actuator), as an alarm output, as a light output, as a defrost actuator for the auxiliary evaporator, as a pump down valve control, as the condenser fan output or as a delayed compressor.

H1=0 (Alarm output usually energised) : The relay is de-energised when an alarm occurs;

The AUX output in "alarm" mode can be set to operate either with the relay energised or de-energised. The latter operation mode ensures maximum safety, because the alarm is also activated in the event of power failures or disconnection of the cables.

H1=1 (Alarm output usually non energised) : The relay is energised when an alarm occurs

H1=2 Auxiliary output: The connected actuator can be switched ON/OFF using the aux button.
Switching the actuator ON/OFF is signalled by the AUX icon on the display.

H1=3 (Light output): The light on the unit can be switched on/off when the door is opened, if the door switch is enabled (see parameter A4). If the door switch is enabled, the light is switched off when the door is closed, unless previously switched on from the keypad. Switching the light on/off is signalled by the icon on the display.

H1=4 (Auxiliary evaporator defrost output) : A heater or reversing valve can be controlled to perform an electric heater defrost or hot gas defrost on the auxiliary evaporator.

H1=5 (Pump-Down valve output) : The activation and the deactivation of the pump down valve can be controlled.

H1=6 (Condenser fan output): If the high condenser temperature alarm is activated (see 'Ac'), the output can be used to control the condenser fans.

H1=7(Delayed compressor output); The output is activated a few seconds after the compressor starts (the delay is established by parameter 'c11', deactivation of the compressor output corresponds to immediate deactivation of the delayed compressor. If this operating mode is set, it is also active during the compressor pump down and autostart phases, if selected with the appropriate parameters.
H1=8 (Auxiliary output with deactivation when OFF): In the off status, the auxiliary output cannot be activated. When starting again, the auxiliary output returns to the previous status.
H1=9 (Light output with deactivation when OFF): In the off status, the light cannot be activated. When starting again, the light returns to the previous status.

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H1=10 (No function associated with the output): In this case, the logical output AUX1 is not used for any function.
Summary:
H1=0 Alarm output: normally energised;.
H1=0 Alarm output: normally de-energised;
H1=2 Auxiliary output;
H1=3 Light output;
H1=4 Auxiliary evaporator defrost output;
H1=5 Pump-Down valve output:
H1=6 Condenser fan output;;
H1=7 Delayed compressor output;
H1=8 Auxiliary output, with deactivation set to OFF;
H1=9 Auxiliary output, with deactivation set to OFF;
H1=10 No function associated with the output.

Warning: the mode 'H1'=0 is useful also for signalling power failures with an alarm.
Default: 'H1'=1 => relay energised with alarm active. Available on all models supplied with Relay 4.

H2 : Disable keypad and/or remote control
Parameter 'H2' can be used to inhibit some functions relating to the use of the keypad, for example, the modification of the parameters and the set point if the unit is accessible by the public.
The following are available:

Keypad functions

Parameter "H2"	0	1	2	3	4	5	6
HACCP PRG/MUTE (mute)							
UP/AUX					♦	♦	♦
DOWN/DEF (defrost)					♦	♦	♦
SET (modification of type F parameters)	♦		♦			♦	♦

Modification of the set point							
Modification from the remote control							

When the **set point modification** and **parameter modification** functions inhibited, neither the set point nor the type 'F' parameters can be changed, while their values can still be displayed. The type 'C' parameters, on the other hand, being password protected, can **also be modified** from the keypad, following the procedure described previously. With the **remote control** disabled, only the values of the parameters can be displayed, but they cannot be modified; in addition, the mute, defrost, continuous cycle, aux (auxiliary 1), light (auxiliary 2) and on/off functions are disabled.

Warnings: If H2=2 or H2=3 is set on the remote control, the control is immediately disabled. To re-enable the remote control, set H2=0 or H2=1 on the keypad.
Default: H2=1=> all enabled

H3: Enabling code for programming from the remote control
Parameter 'H3' assigns an access code to the remote control. As already described, this allows the remote control to be used when there is more than one controller present on the same panel, without the risk of interference.
For further details, see the paragraph on the use of the remote control.

Default: 'H3'='00' => programming from the remote control without code.

H4: Disable buzzer

This parameter can have two values:
H4=0 buzzer enabled;
H4=1 buzzer disabled

Default: H4=0=> buzzer enabled.

Available on all models.

H6: Lock keypad
This is used to disable the functions assigned to the individual buttons.
Using the corresponding bits, the functions relating to the individual buttons on the keypad can be enabled (setting to 1) or disabled (setting to 0), according to the following relationships:

IMPORTANT: the functions disabled using parameter H6 are added to those disabled using parameter H2..

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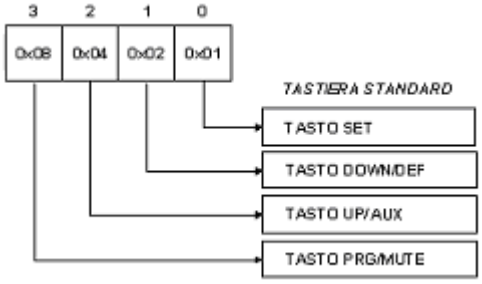
- **ir33 Keypad:**



Total (value of parameter H6)

	Value	
Function	Disable	+
SET button	1	
Down/def button	2	
Up/Aux button	4	
Prg/mute button	8	

To calculate the value to be assigned to parameter H6, simply sum the values assigned to the functions that should be disabled.

Example: enable "SET button", and "Aux button"

→ 1 + 32 = 34 → Parameter H6

Bit	Mask	Key	Functions that can be enabled/disabled
0	0x01	SET	*Enter HACCP;* *Report printing procedure*
1	0x02	def	*Defrost;* *Continuous cycle* *Enter HACCP*
2	0x04	aux	*Enable/disable auxiliary output 1* *Continuous cycle*

3	0x08	PRG mute	*Mute;*

Table 1: Functions enabled/disabled on the standard keypad.

Default: H6=0=> all keys disabled

H8 : Select light or aux output to activate with time band.

H8=0=> Time band linked to output configured for light.
H8=1=> Time band linked to output configured as AUX.

With this parameter, you can select the output to activate or disable according to the specified time band (see parameters ton and tof).

Note: the output you wish to command (light o aux) must be available and be selected with parameter H1.

Default: H8=0 => time band linked to light

HPr: Print profile
This is used for selecting the profile you require for printing the Report on an external printer.

Default: HPr=0 => Report printing disabled.

7.8 HACCP alarm management parameters

No.	Code	Parameter	MSYF	UOM	Type	Def.	Max	Min
89	HAn	Number of HA events recorded	MSYF	flag	C	0	15	0
90	HA	Date/time of last HA event	MSYF	-	C	-	-	-
91	HA1	Date/time of penultimate HA event	MSYF	-	C	-	-	-
92	HA2	Date/time of third from last HA event	MSYF	-	C	-	-	-
93	HFn	Number of HF events recorded	MSYF	-	C	0	15	0
94	HF	Date/time of last HF event	MSYF	-	C	-	-	-
95	HF1	Date/time of penultimate HF event	MSYF	-	C	-	-	-
96	HF2	Date/time of third-to-last HF event	MSYF	-	C	-	-	-
97	Htd	HACCP alarm delay	MSYF	-	C	0	250	0

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HAn: Number of HA alarm events recorded
This parameter indicates the number of 'HA' alarms activated. A maximum of 15 events can be counted. For each alarm event after the 15th, the counter stays at 15.
Default: HAn=0

HA : Date/time of the last HA event
HA1 : Date/time of the penultimate HA event
HA2 : Date/time of the third from last HA event

This parameter accesses a submenu where, by pressing the aux and def buttons, the year, month, day, hour, minutes and duration of the last 'HA' alarm activated can be scrolled.
e.g.: y03 -> M07 -> d22 -> h23 -> m57 -> t99
indicates that the last alarm 'HA' was activated on 22 July 2003 at 23:57 and lasted 99 hours.
Default: 0

HFn: Number of HF alarm events recorded
This parameter indicates the number of 'HF' alarms activated. A maximum of 15 events can be counted. For each alarm event after the 15th, the counter stays at 15.
Default: HFn=0
HF : Date/time of the last HF event
HF1: Date/time of the penultimate HF event
HF2 Date/time of the third from last HF event

This parameter accesses a submenu where, by pressing the aux and def buttons, the year, month, day, hour, minutes and duration of the last 'HF' alarm activated can be scrolled.

e.g.: y03 -> M08 -> d29 -> h19 -> m45 -> t98
indicates that the last 'HF' alarm was activated on 29 August 2003 at 19:45 and lasted 98 hours.
Default: 0

Htd: HACCP alarm delay

Delay time in minutes that, added to the time 'Ad', determines the time interval after which the 'HA' error is activated.
If set to 0, HACCP monitoring (HA that HF) is disabled.
Any alarms already saved will still be stored, even when Htd=0.
Default: Htd=0=> HACCP monitoring disabled

7.9 RTC and timed defrost management parameters

No.	Code	Parameter	MSYF	UOM	Type	Def.	Max	Min
98	td1	Defrost time band 1	-SYF	-	C	-	-	-
99	td2	Defrost time band 2	-SYF	-	C	-	-	-
100	td3	Defrost time band 3	-SYF	-	C	-	-	-
101	td4	Defrost time band 4	-SYF	-	C	-	-	-
102	td5	Defrost time band 5	-SYF	-	C	-	-	-
103	td6	Defrost time band 6	-SYF	-	C	-	-	-
104	td7	Defrost time band 7	-SYF	-	C	-	-	-
105	td8	Defrost time band 8	-SYF	-	C	-	-	-
106	ton	Light/aux activation time band	-SYF	-	C	-	-	-
107	tof	Light/aux disabling time band	-SYF	-	C	-	-	-
108	tc	RTC date/time setting	MSYF	-	C	-	-	-

td1...td8: Defrost time band 1…8
These parameters can be used to set up to 8 defrost events linked to the system clock. To display and set or modify one of the events, access one of the parameters between 'td1' and 'td8', and then press SET. you enter a submenu in which the aux or def button can be used to display and set the day, hour and minutes of the defrost event :
In the following example. day 8 (from the Monday to Friday), hours 23, minutes 57.
d08 def h23 def m57 def d08 def …

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To modify the day, hour or minutes of the event, access the desired parameter by pressing the aux or def button and then press SET to modify the value.
the letter identifying the parameter disappears, and, at this point, the value can be increased or decreased using or with push-buttons aux or def.

The parameter '**d__'** sets the day of the event, as follows:
'd__'=0 => event disabled
'd__'=1..7 => Monday…Sunday
'd__'=8 => from Monday to Friday
'd__'=9 => from Monday to Saturday
'd__'=10 => Saturday to Sunday
'd__'=11 => all days

When 'h__' (0…23), 'm__' (0…59), this sets the hour and minutes of the event.

Default: 'd__'=0, 'h__'=0, 'm__'=0 => Event disabled

Pressing SET temporarily saves the changes to the modified parameter and returns to the submenu for setting the event.
The display or modification of the parameters corresponding to the event can be continued, or you can return to the list of RTC parameters by pressing PRG mute.

ton and tof: Light/aux activation/disabling time band
With these parameters, you can set activation and/or disabling of the light or aux connected to the system clock (for aux or light selection, see parameter H8).

To display, set or modify one of the two events, access one of the two parameterstwo ton 0 or toF parameters, and then press SET.
Use the ton parameter to set activation time, and the toF parameter to disable it.

Press SET to enter a submenu in which the aux or def button can be used to display and set the day, hour and minutes of the defrost ON or OFF event.:

For example, to set ON from Monday to Saturday at 8.30 hours, and OFF from Monday to Saturday at 19.30 hours.:

ton;
d09 def h8 def m30 def

toF:
d09 def h19 def m30 def

To modify the day, hour or minutes of the event, access the desired parameter by pressing the aux or def button and then press SET to modify the value.
When pressing SET**,** the letter identifying the parameter disappears, and the value can no longer be increased or decreased using aux or def.

The parameter '**d__'** sets the day of the event, as follows:

'd__'=0 => event disabled
'd__'=1..7 => Monday…Sunday
'd__'=8 => from Monday to Friday
'd__'=9 => from Monday to Saturday
'd__'=10 => Saturday and Sunday
'd__'=11 => all days

When 'h__' (0…23), 'm__' (0…59), this sets the hour and minutes of the event.

Default: 'd__'=0, 'h__'=0, 'm__'=0 => Event disabled

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Pressing SET temporarily saves the changes to the parameter and returns to the submenu for setting the event.
The display or modification of the parameters corresponding to the event can be continued, or you can return to the list of RTC parameters by pressing PRG mute.

During the ON or OFF band of the output selected with parameter H8, you can disable or enable the output with the keypad, and, in any event, all other ON/OFF sources remain valid: door switch, curtain switch, keypad….

IMPORTANT: you can also analyse just one of the ON or OFF events, in which case, you can activate the OFF or ON event (example: you can arrange for the lights to go on automatically and be turned off manually from the keypad, if you leave the premises

IMPORTANT: the ton and toF timed ON and OFF light or aux events (according to parameter H8) are active in OFF status too. Therefore, it may happen that, if the output is programmed as disabled in OFF (H1=8 or 9, outputs disabled in OFF), if an activation or disabling event occurs during OFF status, when re-activated, the output will indicate the status following the event that occurred and, therefore, this could differ from the status at disabling time.

tc: RTC date/time setting
This parameter is used be set the date/time of the internal Real Time Clock.
Selecting the parameter 'tc' and pressing the SET button accesses a submenu in which the aux or def button can be used to display and set the current year, month, day of the month, day of the week, hour and minute.
y03 def M03 def d06 def u04 def h11 def m56

the following are set in the example: Thursday 6 March 03 at 11.56 hours, where:
'y__': indicates the year (0…99);
'M__': indicates the month (1…12) where January=1…December=12;
'd__': indicates the day of the month (1...31);
'u__': indicates the day of the week (1...7) where Monday=1…Sunday=7;
'h__': indicates the hour (0...23);
'm__': indicates the minutes (0...59).

To set the RTC parameters, follow the procedure as described for parameters 'td1'...'td8'.
These parameters have an immediate effect, that is, they are saved without having to press the SET button for 5 seconds.

The 'EtC' alarm indicates a clock malfunction, described in the table below*:*

Malfunction	**Solution**	**E*tC reset***
Communication error	Repeat the operations after 5s	automatic
Clock stopped	Restart with kick start	automatic
Incorrect calibration signature	Delete calibration	automatic
Off time calculation on power-up	Cancel off time	automatic
Act time saving	Repeat the operations for each task	automatic
Date and time not correct	Set correct date and time	manual

The 'EtC' alarm is generated when the malfunction occurs more than 3 consecutive times. If a malfunction, despite not having generated an 'EtC' error, has prevented the correct reading of the current time, the clock functions (off time calculation, defrost activation on time bands) will be temporarily suspended or performed with reference to the last time read correctly. The clock readings are repeated every 5 seconds.
On power-up, the date and time are set to Saturday (6) 01/01/00 at 00:00 hours.
To cancel the 'EtC' error, simply set the clock using the appropriate parameters.

Note: If the 'EtC' error appears and the system is then switched off, on re-start the 'EtC' will no longer be present, being corrected by the previous start-up.

8. Tables of alarms and signals

8.1 Table of alarms and signals: display, buzzer and relay.

The following table describes the alarms and signals on the controller, with their description, the status of the buzzer, the alarm relay and the reset mode.

Code	**Icon on the display**	**Alarm relay**	**Buzzer**	**Reset**	**Description**
'rE'	flashing	active	active	automatic	virtual control probe fault
'E0'	flashing	off	off	automatic	room probe S1 fault
'E1'	flashing	off	off	automatic	defrost probe S2 fault
'E2'	flashing	off	off	automatic	probe S3 fault
'E3'	flashing	off	off	automatic	probe S4 fault
'E4'	flashing	off	off	automatic	probe S5 fault
'___'	No	off	off	automatic	probe not enabled
'LO'	flashing	active	active	automatic	low temperature alarm
'HI'	flashing	active	active	automatic	high temperature alarm
'IA'	flashing	active	active	automatic	immediate alarm from external contact
'dA'	flashing	active	active	automatic	delayed alarm from external contact
dEF	on	off	off	automatic	defrost running
'Ed1'	No	off	off	automatic/manual	defrost on evaporator 1 ended by timeout
'Ed2'	No	off	off	automatic/manual	defrost on evaporator 2 ended by timeout
Pd	flashing	active	active	automatic/manual	maximum pump down time alarm
'LP'	flashing	active	active	automatic/manual	low pressure alarm
'AtS'	flashing	active	active	automatic/manual	autostart in pump down
'cht'	No	off	off	automatic/manual	high condenser temperature pre-alarm
'CHT'	flashing	active	active	manual	high condenser temperature alarm
'dor'	flashing	active	active	automatic	door open too long alarm
'Etc'	flashing	off	off	automatic	real time clock fault
'EE'	flashing	off	off	automatic	E²prom error, unit parameters
'EF'	flashing	off	off	automatic	E²prom error, operating parameters
HA	HACCP flashing	off	off	automatic	HACCP alarm, 'HA'
HF	HACCP flashing	off	off	automatic	HACCP alarm, 'HF'

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'rCt'	No	off	off	automatic	instrument enabled for programming from the remote control
'Add'	No	off	off	automatic	automatic address assignment procedure in progress
'Prt'	No	off	off	automatic	printing report
'LrH'	No	off	off	automatic	activation of low relative humidity procedure
'HrH'	No	off	off	automatic	activation of high relative humidity procedure
'ccb'	Signal				start continuous cycle request
'ccE'	Signal				end continuous cycle request
'dFb'	Signal				start defrost request
'dFE'	Signal				end defrost request
ON	Signal				switch to ON
OFF	Signal				switch to OFF
'rES'	Signal				reset alarms with manual reset reset HACCP alarms reset temperature monitoring

The buzzer sounds if enabled by parameter 'H4'.
The alarm relay is activated if auxiliary output 1 (H1) has been assigned the alarm relay function (normally closed or normally open).
Note: the buzzer is disabled by the CAREL Supervisory System.

8.2 Table of alarms and signals: functions enabled/disabled.

The following table highlights the functions that are enabled and disabled in the various alarm situations.

Code	PD valve	Compressor	Defrost	Evap. fans	Cond. fans	Continuous cycle
'rE'	Duty setting ('c4')	Duty setting ('c4')	Disabled	Disabled	Disabled	Disabled
'E0'	Duty setting ('c4')	Duty setting ('c4')	Disabled	Disabled	Disabled	Disabled
'E1'	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
'E2'	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
'E3'	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
'E4'	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
'___'	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
'LO'	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
'HI'	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
'IA'	duty setting ('A6')	duty setting ('A6')	Disabled	Disabled	Disabled	Disabled
'dA'	duty setting ('A6')	duty setting ('A6')	Disabled	Disabled	Disabled	Disabled
dEF	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
'Ed1'	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
'Ed2'	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
Pd	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
'LP'	off	off	Disabled	Disabled	Disabled	Disabled
'Ats'	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
'cht'	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
'CHt'	off	off	Disabled	Disabled	Disabled	Disabled
'dor'	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
'Etc'	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
'rCt'	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
'Add'	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
'Prt'	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
'LrH'	Disabled	Disabled	Disabled	Off	Disabled	Disabled
'HrH'	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
'EE'	off	off	Disabled	off	off	Disabled
'EF'	off	off	not performed	off	off	not performed

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HA	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled
HF	Disabled	Disabled	Disabled	Disabled	Disabled	Disabled

8.3 Table of operating parameters

M.U. = Measurement unit; Def. = Default value.

No.	Code	Parameter	MSYF	M.U.	Type	Def.	Max	Min
	Pw	password	MSYF	-	C	22	200	0
1	**/2**	Measurement stability	MSYF	-	C	4	15	1
2	**/3**	Probe display slow-down	MSYF	-	C	0	15	0
3	**/4**	Virtual probe	MSYF	-	C	0	100	0
4	**/5**	Select °C or °F	MSYF	flag	C	0	1	0
5	**/6**	Decimal point	MSYF	flag	C	0	1	0
6	**/tI**	Display on internal terminal	MSYF	-	C	1	6	1
7	**/tE**	Display on external terminal	MSYF	-	C	0	6	0
8	**/P**	Select type of probe	MSYF	-	C	0	2	0
9	**/A2**	Configuration of probe 2	M-YF	-	C	2	3	0
			-S--	-	C	0	3	0
10	**/A3**	Configuration of probe 3	MSYF	-	C	0	3	0
11	**/A4**	Configuration of probe 4	MSYF	-	C	0	3	0
12	**/c1**	Calibration of probe 1	MSYF	°C/°F	C	0.0	20	-20
13	**/c2**	Calibration of probe 2	MSYF	°C/°F	C	0.0	20	-20
14	**/c3**	Calibration of probe 3	MSYF	°C/°F	C	0.0	20	-20
15	**/c4**	Calibration of probe 4	MSYF	°C/°F	C	0.0	20	-20
16	**St**	Temperature set point	MSYF	°C/°F	F	0.0	r2	r1
17	**rd**	Control delta	-SYF	°C/°F	F	2.0	20	0.1
18	**r1**	Minimum permissible set point	MSYF	°C/°F	C	-50	r2	-50
19	**r2**	Maximum permissible set point	MSYF	°C/°F	C	60	200	r1
20	**r3**	Operating mode	-SYF	flag	C	0	2	0
21	**r4**	Automatic night-time set point variation	MSYF	°C/°F	C	3.0	20	0.0
22	**r5**	Enable temperature monitoring	MSYF	flag	C	0	1	0
23	**rt**	Temperature monitoring interval	MSYF	hours	F	-	999	0
24	**rH**	Maximum temperature read	MSYF	°C/°F	F	-	-	-
25	**rL**	Minimum temperature read	MSYF	°C/°F	F	-	-	-
26	**c0**	Comp. and fan delay on start-up	-SYF	min	C	0	15	0
27	**c1**	Minimum time between successive starts	-SYF	min	C	0	15	0
28	**c2**	Minimum compressor OFF time	-SYF	min	C	0	15	0
29	**c3**	Minimum compressor ON time	-SYF	min	C	0	15	0
30	**c4**	Duty setting	-SYF	min	C	0	100	0
31	**cc**	Continuous cycle duration	-SYF	hours	C	0	15	0
32	**c6**	Alarm bypass after continuous cycle	-SYF	hours	C	2	15	0
33	**c7**	Maximum pump down time	-SYF	min	C	0	30	0
34	**c8**	Comp. start delay after open PD valve	-SYF	sec	C	5	60	0
35	**c9**	Enable autostart function in PD	-SYF	flag	C	0	1	0
36	**c10**	Select Pump down by time or pressure	-SYF	flag	C	0	1	0
37	**c11**	Second compressor delay	-SYF	sec	C	4	250	0
38	**d0**	Type of defrost	-SYF	flag	C	0	3	0
39	**dI**	Interval between defrosts	-SYF	hours	F	8	250	0
40	**dt1**	End defrost temperature, main evap.	-SYF	°C/°F	F	4.0	200	-50
41	**dt2**	End defrost temperature, aux evap.	-SYF	°C/°F	F	4.0	200	-50
42	**dP1**	Maximum defrost duration, main evap.	-SYF	min	F	30	250	1
43	**dP2**	Maximum defrost duration, aux evap.	-SYF	min	F	30	250	1
44	**d3**	Defrost start delay	-SYF	Min	C	0	250	0
45	**d4**	Enable defrost on start-up	-SYF	flag	C	0	1	0
46	**d5**	Defrost delay on start-up	-SYF	min	C	0	250	0
47	**d6**	Display on hold during defrost	-SYF	-	C	1	2	0
48	**dd**	Dripping time after defrost	-SYF	min	F	2	15	0
49	**d8**	Alarm bypass after defrost	-SYF	hours	F	1	15	0
50	**d9**	Defrost priority over compressor protectors	-SYF	flag	C	0	1	0
51	**d/1**	Display defrost probe	MSYF	°C/°F	F	-	-	-
52	**d/2**	Display defrost probe	MSYF	°C/°F	F	-	-	-
53	**dC**	Time base for defrost	-SYF	flag	C	0	1	0
54	**d10**	Compressor running time	-SYF	hours	C	0	250	0
55	**d11**	Running time temperature threshold	-SYF	°C/°F	C	1.0	20	-20
56	**d12**	Advanced defrost	-SYF	-	C	0	3	0
57	**dn**	Nominal defrost duration	-SYF	-	C	65	100	1

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58	**dH**	Proportional factor, variat. of 'dI'	-SYF	-	C	50	100	0
59	**A0**	Alarm and fan differential	MSYF	°C/°F	C	2.0	20	0.1
60	**A1**	Type of threshold 'AL' and 'AH'	MSYF	flag	C	0	1	0
61	**AL**	Low temperature alarm threshold	MSYF	°C/°F	F	0.0	200	-50
62	**AH**	High temperature alarm threshold	MSYF	°C/°F	F	0.0	200	-50
63	**Ad**	Low and high temperature alarm delay	MSYF	min	F	120	250	0
64	**A4**	Digital input 1 configuration	-SYF	-	C	0	12	0
			M---	-	C	3	12	0
65	**A5**	Digital input 2 configuration	MSYF	-	C	0	12	0
66	**A6**	Stop compressor from external alarm	-SYF	min	C	0	100	0
67	**A7**	External alarm detection delay	-SYF	min	C	0	250	0
68	**A8**	Enable alarms 'Ed1' and 'Ed2'	-SYF	flag	C	0	1	0
69	**Ado**	Light management mode with door switch	MSYF	flag	C	0	1	0
70	**Ac**	Condenser high temperature alarm	-SYF	°C/°F	C	70.0	200	0.0
71	**AE**	High condens. temperature alarm differential	-SYF	°C/°F	C	5.0	20	0.1
72	**Acd**	High condens. temperature alarm delay	-SYF	min	C	0	250	0
73	**AF**	Light sensor OFF time	-SYF	sec	C	0	250	0
74	**F0**	Fan management	---F	flag	C	0	2	0
75	**F1**	Fan start temperature	---F	°C/°F	F	5.0	200	-50
76	**F2**	Fan OFF with compressor OFF	---F	flag	C	1	1	0
77	**F3**	Fans in defrost	---F	flag	C	1	1	0
78	**F4**	Condenser fan switch-OFF temperature	MSYF	°C/°F	C	40	200	-50
79	**F5**	Condenser fan switch-ON differential	MSYF	°C/°F	C	5.0	20	0.1
80	**Fd**	Fan OFF after dripping	---F	min	F	1	15	0
81	**H0**	Serial address	MSYF	-	C	1	207	0
82	**H1**	Function of relay 4	MSYF	flag	C	1	10	0
83	**H2**	Disable keypad/IR	MSYF	flag	C	1	6	1
84	**H3**	Remote control enabling code	MSYF	-	C	0	255	0
85	**H4**	Disable buzzer	MSYF	flag	C	0	1	0
86	**H6**	Lock keypad	MSYF	-	C	0	255	0
87	**H8**	Selection of activation output with time band	MSYF	flag	C	0	1	0
88	**HPr**	Print profile	MSYF	-	C	0	15	0
89	**HAn**	Number of HA events recorded	MSYF	-	C	0	15	0
90	**HA**	**Date/time of last HA event**	**MSYF**	**-**	**C**	-	-	-
	y__	Year	****	Years	*	0	99	0
	M__	Month	****	Months	*	0	12	1
	d__	Day	****	Days	*	0	7	1
	h__	Hour	****	Hours	*	0	23	0
	n__	Minutes	****	Min.	*	0	59	0
	t__	Duration	****	Hours	*	0	99	0
91	**HA1**	**Date/time of penultimate HA event**	**MSYF**	**-**	**C**	-	-	-
	y__	Year	****	Years	*	0	99	0
	M__	Month	****	Months	*	0	12	1
	d__	Day	****	Days	*	0	7	1
	h__	Hour	****	Hours	*	0	23	0
	n__	Minutes	****	Min.	*	0	59	0
	t__	Duration	****	Hours	*	0	99	0
92	**HA2**	**Date/time of third from last HA event**	**MSYF**	**-**	**C**	-	-	-
	y__	Year	****	Years	*	0	99	0
	M__	Month	****	Months	*	0	12	1
	d__	Day	****	Days	*	0	7	1
	h__	Hour	****	Hours	*	0	23	0
	n__	Minutes	****	Min.	*	0	59	0
	t__	Duration	****	Hours	*	0	99	0
93	**HFn**	Number of HF events recorded	MSYF	-	C	0	15	0
94	**HF**	**Date/time of last HF event**	**MSYF**	**-**	**C**	-	-	-
	y__	Year	****	Years	*	0	99	0
	M__	Month	****	Months	*	0	12	1
	d__	Giorno	****	Days	*	0	7	1
	h__	Hour	****	Hours	*	0	23	0
	n__	Minutes	****	Min.	*	0	59	0
	t__	Duration	****	Hours	*	0	99	0
95	**HF1**	**Date/time of penultimate HF event**	**MSYF**	**-**	**C**	-	-	-
	y__	Anno	****	Years	*	0	99	0
	M__	Month	****	Months	*	0	12	1
	d__	Day	****	Days	*	0	7	1
	h__	Hour	****	Hours	*	0	23	0
	n__	Minutes	****	Min.	*	0	59	0
	t__	Duration	****	Hours	*	0	99	0

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96	**HF2**	**Date/time of third-to-last HF event**	**MSYF**	**-**	**C**	0	**-**	**-**
	y__	Year	****	Years	*	0	99	0
	M__	Month	****	Months	*	0	12	1
	d__	Day	****	Days	*	0	7	1
	h__	Ora	****	Hours	*	0	23	0
	n__	Minutes	****	Min.	*	0	59	0
	t__	Duration	****	Hours	*	0	99	0
97	**Htd**	HACCP alarm delay	MSYF	min	C	0	250	0
98	**td1**	**Defrost time band 1**	**-SYF**	**-**	**C**	**-**	**-**	**-**
	d__	Day	****	Days	*	0	11	0
	h__	Hour	****	Hours	*	0	23	0
	n__	Minutes	****	Min.	*	0	59	0
99	**td2**	**Defrost time band 2**	**-SYF**	**-**	**C**	**-**	**-**	**-**
	d__	Day	****	Days	*	0	11	0
	h__	Hour	****	Hours	*	0	23	0
	n__	Minutes	****	Min.	*	0	59	0
100	**td3**	**Defrost time band 3**	**-SYF**	**-**	**C**	**-**	**-**	**-**
	d__	Day	****	Days	*	0	11	0
	h__	Ora	****	Hours	*	0	23	0
	n__	Minutes	****	Min.	*	0	59	0
101	**td4**	**Defrost time band 4**	**-SYF**	**-**	**C**	**-**	**-**	**-**
	d__	Day	****	Days	*	0	11	0
	h__	Hour	****	Hours	*	0	23	0
	n__	Minutes	****	Min.	*	0	59	0
102	**td5**	**Defrost time band 5**	**-SYF**	**-**	**C**	**-**	**-**	**-**
	d__	Day	****	Days	*	0	11	0
	h__	Hour	****	Hours	*	0	23	0
	n__	Minutes	****	Min.	*	0	59	0
103	**td6**	**Defrost time band 6**	**-SYF**	**-**	**C**	**-**	**-**	**-**
	d__	Day	****	Days	*	0	11	0
	h__	Hour	****	Hours	*	0	23	0
	n__	Minutes	****	Min.	*	0	59	0
104	**td7**	**Defrost time band 7**	**-SYF**	**-**	**C**	**-**	**-**	**-**
	d__	Day	****	Days	*	0	11	0
	h__	Hour	****	Hours	*	0	23	0
	n__	Minutes	****	Min.	*	0	59	0
105	**td8**	**Defrost time band 8**	**-SYF**	**-**	**C**	**-**	**-**	**-**
	d__	Day	****	Days	*	0	11	0
	h__	Hour	****	Hours	*	0	23	0
	n__	Minutes	****	Min.	*	0	59	0
106	**ton**	**Light/aux activation time band**	**-SYF**	**-**	**C**	**-**	**-**	**-**
	d__	Day	****	Days	*	0	11	0
	h__	Ora	****	Ore	*	0	23	0
	n__	Minutes	****	Min.	*	0	59	0
107	**toF**	**Light/aux disabling time band**	**-SYF**	**-**	**C**	**-**	**-**	**-**
	d__	Day	****	Days	*	0	11	0
	h__	Ora	****	Ore	*	0	23	0
	n__	Minuto	****	Min.	*	0	59	0
	n__	Minuto	****	Min.	*	0	59	0
	h__	Ora	****	Ore	0	0	23	0
	n__	Minutes	****	Min.	0	0	59	0
108	**tc**	**RTC date/time setting**	**MSYF**	**-**	**C**	**-**	**-**	**-**
	y__	Year	****	Years	0	00	99	0
	M__	Month	****	Months	1	1	12	1
	d__	Day of the month	****	Days	1	1	31	1
	u__	Day of the week	****	Days	6	6	7	1
	h__	Hour	****	Hours	0	0	23	0
	n__	Minutes	****	Min.	0	0	59	0

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9. Supervision

The controller supports the CAREL standard serial protocol.

9.1 Semi-automatic procedure for assigning addresses in the CAREL network

The semi-automatic procedure for assigning the addresses in the CAREL network is performed using a program running on a PC that manages the various phases.

9.1.1 Phase 1, acquisition of network status

Starting off from a pre-installed network, the network status must be acquired.
The program on the PC will scan the CAREL network, interrogating all the possible addresses and recording those that are physically present.
The program also refers to the network description table, saved at the end of the previous installation and then recovered, regarding the addresses already assigned, and their description and type.

Example:

Address	Line	Description	Type of unit
1	1	Dairy	IR32
5	1	Meat	IRMPX
7	1	Frozen	IR32

Any new controllers not present in the table will appear without description at the end of the scan. The user can then add the description.

Example:

Address	Line	Description	Type of unit
1	1	Dairy	IR32
2	1	Dairy 3	PB
5	1	Meat	IRMPX
7	1	Frozen	IR32

9.1.2 Phase 2, semi-automatic assignment of the addresses

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At this point, the controllers to be included in the network must be added.
The program runs the automatic address assignment procedure, sending the following command in the network;

<STX><padr><'! '><padr_new><ETX><chkh><chkl>
Where **<padr> = 0** so that the command is received by all the controllers.

This is performed only by the controller in address assignment status, and when the command is received, the unit:

- saves the new serial address,
- sends the response packet to the PC,
- displays the address received;
- exits the address assignment procedure.

The command, received from an instrument with **<padr> <> 0,** assigns the new value contained in **<padr_new>** for the serial address.

The response to the PC is the same as the request for the software version **<'?'>:**
<STX><padr><'V'><Peripheral ID>[<Bios Code>]<ETX><chkh><chkl>

In this way, the program on the PC automatically updates the table with the type of unit.
The user will have noted the whether the address assigned by the semi-automatic procedure corresponds to the description of the controller.
Example:

Address	Line	Description	Type of unit
1	1	Dairy	IR32
2	1	Dairy 3	IR32
3	1	Dairy 2	PB
4	1	Meat 2	IRMPX
5	1	Meat	IRMPX
7	1	Frozen	IR32

At the end of the address assignment procedure, the user can update the descriptions of the new controllers installed.

The ir33 controllers can enter address assignment status with the following sequence of operations:

- pressing SET and PRG mute for 5 seconds;

- setting the password 66;
- pressing SET

Now the instrument displays the Add. message. When it receives the new address, it will show its value for 5 seconds on the display. The address assignment procedure has a fixed timeout of 60 seconds.

9.1.3 Phase 3, changing addresses

In the third phase, the use can modify or change the serial addresses assigned to the controls, changing over to free addresses for temporary use.
Example:

Address	Line	Description	Type of unit
1	1	Dairy	IR32
2	1	Dairy 2	IR32
3	1	Dairy 3	IR32
5	1	Meat	IRMPX
6	1	Meat 2	IRMPX
7	1	Frozen	IR32

For some controllers the addresses cannot be changed (as the serial address is not modifiable via the supervisor or is set mechanically). In this case, the program will signal that the desired functions cannot be performed.

9.1.4 Phase 4: table generation

When the network has been configured, the following files are generated automatically:

- driver.ini (defining the communication parameters on a special screen);
- driver. cct;
- .ncf for PlantVisor;
- description of the network (including the communication parameters).

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10. Electrical specifications and connections

10.1 Electrical characteristics of ir33

Power supply	Model	Voltage	Power
	E	230 V~ (+10…-15%), 50/60Hz	3VA, 25mA~ max
	A	115 V~ (+10…-15%), 50/60Hz	6VA, 50mA~ max
	H	115…230V V~ (+10…-15%), 50/60Hz	6VA, 50mA~ max
	L	12…24V V~ (+10…-15%), 50/60Hz	4VA, 300mA~ max Transformer TRADR4W012 315 mA slow-blow fuse in the secondary
	0	12 V~ (+10…-15%), 50/60Hz 12 Vdc from 2 to 18Vdc	4VA, 300mA~ max Traco TRADR4W012 315 mA slow-blow fuse in the secondary

Insulation guaranteed by the power supply	E, A, H	insulation from very low voltage parts	reinforced
			6mm in air, 8mm on surface
			3750V insulation
		insulation from relay outputs	primary
			3mm in air, 4 mm on surface
			1,250V insulation
	0, L	insulation from very low voltage parts	to be guaranteed externally with safety transformer
		insulation from relay outputs	reinforced
			6mm in air, 8mm on surface
			3750V insulation

Inputs	S1	NTC or PTC, depending on the model	
	S2	NTC or PTC, depending on the model	
	DI1 S3	voltage-free contact, contact resistance < 10 ohm, closing current 6 mA NTC or PTC, depending on the model	
	DI2 S4	voltage-free contact, contact resistance < 10 ohm, closing current 6 mA NTC or PTC, depending on the model	
	Maximum probe and digital input distance less than 10m. Note: the power supply and load connections should be kept separate from the probe, digital input, repeater display and supervisor cables.		
Probe types	Std. CAREL PTC	10kΩ at 25 °C, range from –50T90 °C	
		measurement error:	1°C in the range –50T50 °C
			3°C in the range 50T90 °C
	High temperature NTC	50kΩ at 25 °C, range -40T150 °C	
		measurement error:	1.5°C in the range -20T115°C
			4 °C in external range –20T115 °C
	Std. Carel (specific model)	985 Ω at 0°C, range –50T150 °C	
		measurement error	2 °C in range –50T50 °C
			4 °C in the range 50T150 °C

Relay outputs	*depending on the model*				
		EN60730-1		UL 873	
		250V~	operating cycles	current at 250V~	operating cycles
	5 A slim	5 (1)A	100000	5 A res 1FLA 6LRA C300	30000
	5 A	5 (1)A	100000	5 A res 1FLA 6LRA C300	30000
	8 A	8 (4) on N.O. 6 (4) on N.C. 2 (2) on N.O. and N.C.	100000	8 A res 2FLA 12LRA C300	30000

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	16 A	10 (4)A up to 60 °C on N.O. 12 (2)A on N.O. and N.C.	100000	12 A res 5FLA 30LRA C300	30000
	2HP	10 (10)A	100000	12 A res 12FLA 72LRA	30000
	insulation from the very low voltage parts		reinforced		
			6mm in air, 8 on surface		
			3750V insulation		
	insulation between independent relay outputs		primary		
			3mm in air, 4 on surface		
			1,250V insulation		

Connections	Type of connection	Cross-section	Current maximum
	fixed screw on removable for screw blocks faston with crimped contact	for cables from 0.5 to 2.5 mm^2	12A
	Correct sizing of the power cables and connection between the instrument and the loads is the responsibility of the installer. The maximum current in common terminals 1 and 3 is 12A according to model. If using the controller at maximum operating temperature and at full load, use cables with maximum operating temperature of at least 105°C:		

Case	plastic	E,A	dimensions	34.4x76.2x65mm
		0, L, H	dimensions	34.4x76.2x79mm
		E, A	embedding depth	56.5mm
		0, L, H	embedding depth	70,5mm

Installation	panel mounting	with side securing brackets
	drilling template	dimensions 29x71mm
Display	digits	3 digit LED
	display	from –99 to 999
	operating status	indicated with graphic icons on the display
Keypad	4 silicon rubber buttons	
Infrared receiver	available according to the model	
Clock with b buffer battery	available according to the model	
Buzzer	available in all models	
Clock	error at 25°C	± 10 ppm (±5.3 min/year)
	error in the temperature range - 10/60 °C	- 50 ppm (-27 min/year)
	ageing	< ±5 ppm (±2.7 min/year)
	Discharge time	6 months typical (8 months maximum)
	Recharge time	5 hours typical (<8 hours maximum)
Operating temperature	-10T60 °C	
Operating humidity	<90% RH non-condensing	
Storage temperature	-20T70 °C	
Storage humidity	<90% RH non-condensing	
Front panel index of protection	panel installation with IP65 gasket	
Environmental pollution	Normal	
PTI of the insulating materials	> 250V	
Period of electric stress across the insulating parts	Long	
Category of resistance to fire	category D (UL 94-V0)	
Class of protection against voltage surges	category 1	
Type of action and disconnection	1c relay contacts (micro-disconnection)	
Classification according to protection against electric shock	to be integrated in Class I and II devices	

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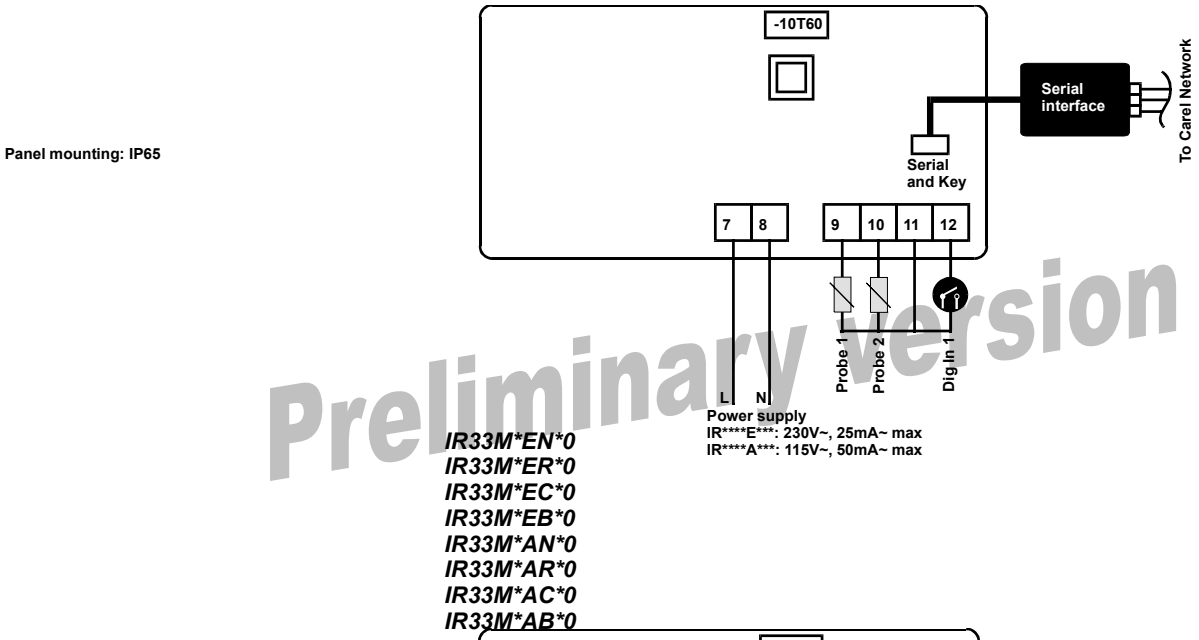
Software class and structure	Class A
Cleaning of instrument front panel	only use neutral detergents and water
Serial interface for CAREL network	External, available on all models
Interface for repeater display	External, available on models with H and 0 power supply.
Maximum distance between interface and display	10 mt
Programming key	Available on all models

10.2 ir33 standard connections

The following are the connections for the assembly of ir33, according to model:

ir33 Connections: 230 Vac or 115 Vac transformer version.



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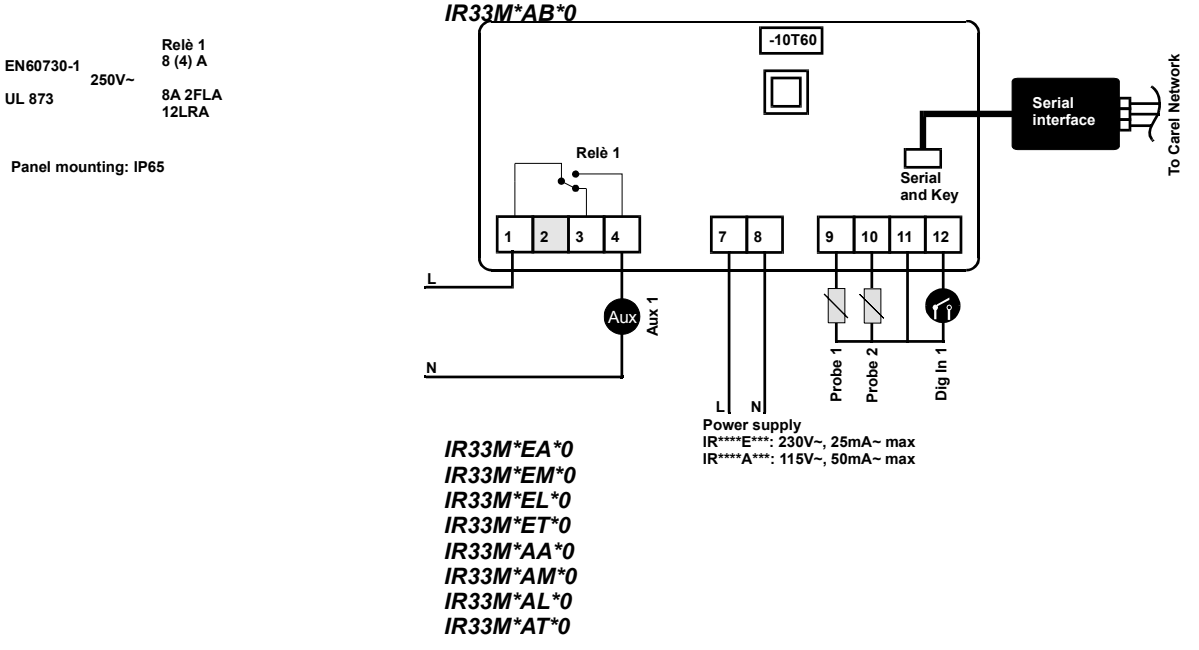
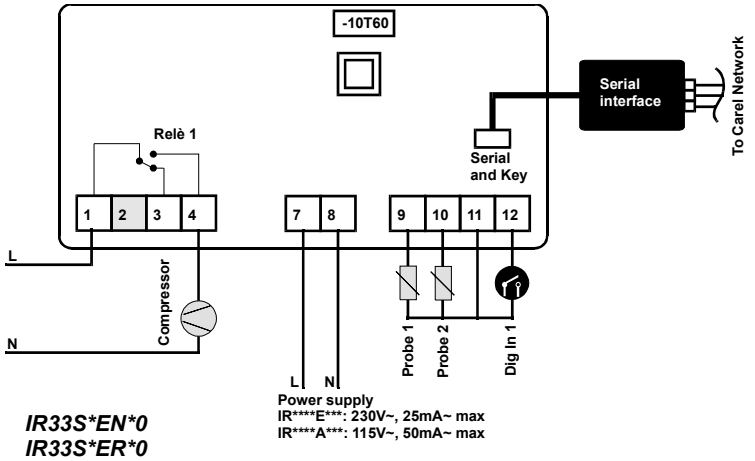


EN60730-1 250V~ Relè 1 8 (4) A
UL 873 8A 2FLA 12LRA

Panel mounting: IP65

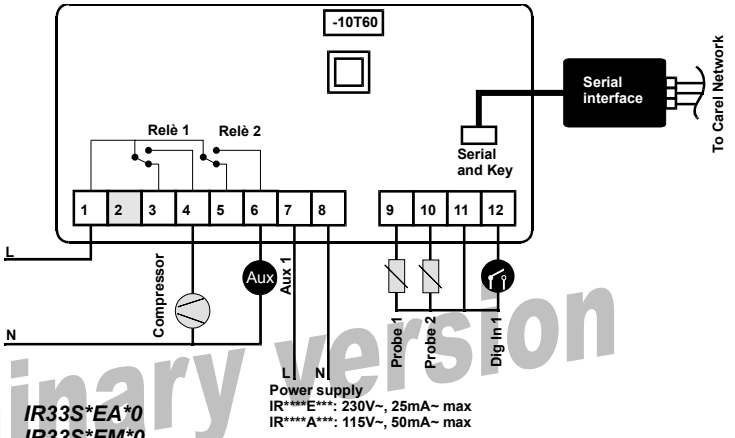


IR33S*EN*0
IR33S*ER*0
IR33S*EC*0
IR33S*EB*0
IR33S*AN*0
IR33S*AR*0
IR33S*AC*0
IR33S*AB*0

EN60730-1 250V~ Relè 1 8 (4) A Relè 2 8 (4) A
UL 873 8A 2FLA 12LRA 8A 2FLA 12LRA

Maximum total current on terminal 1: 12A

Panel mounting: IP65



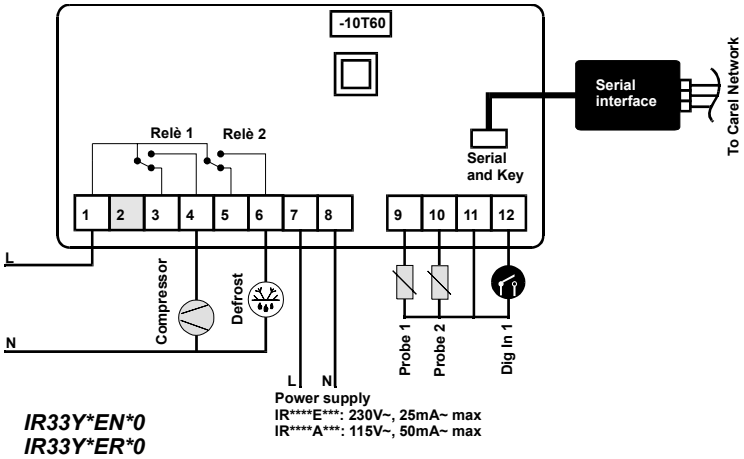
IR33S*EA*0
IR33S*EM*0
IR33S*EL*0
IR33S*ET*0
IR33S*AA*0
IR33S*AM*0
IR33S*AL*0
IR33S*AT*0

Preliminary version

EN60730-1 250V~ Relè 1 8 (4) A Relè 2 8 (4) A
UL 873 8A 2FLA 12LRA 8A 2FLA 12LRA

Maximum total current on terminal 1: 12A

Panel mounting: IP65

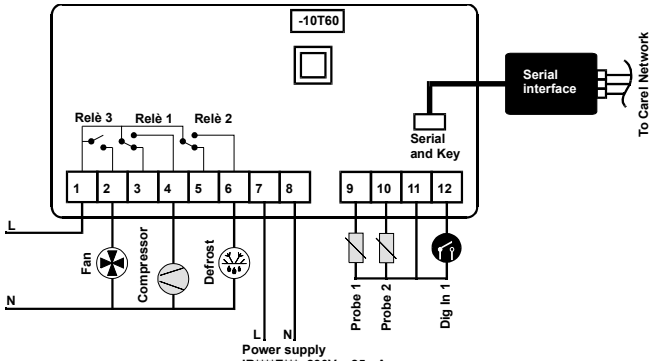


IR33Y*EN*0
IR33Y*ER*0
IR33Y*EC*0
IR33Y*EB*0
IR33Y*AN*0
IR33Y*AR*0
IR33Y*AC*0
IR33Y*AB*0

		Relè 1	Relè 2	Relè 3
EN60730-1	250V~	8 (4) A	8 (4) A	5 (1) A
UL 873		8A 2FLA 12LRA	8A 2FLA 12LRA	5A 1FLA 6LRA

Maximum total current on terminal 1: 12A

Panel mounting: IP65

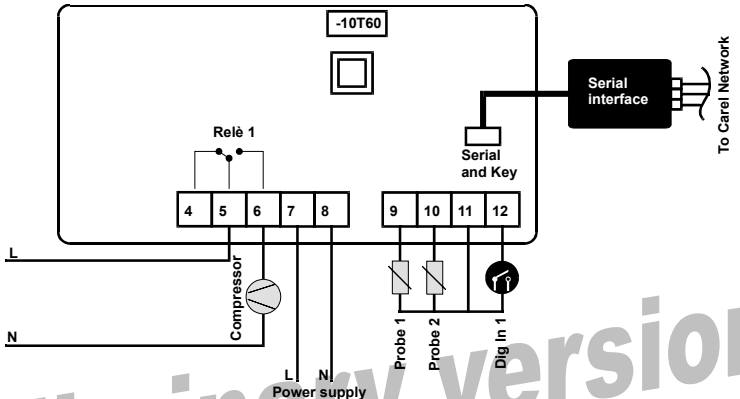


IR33F*EN*0
IR33F*ER*0
IR33F*EC*0
IR33F*EB*0
IR33F*AN*0
IR33F*AR*0
IR33F*AC*0
IR33F*AB*0

ir33 Connections: 230 Vac or 115 Vac with transformer and 16 A relay version

		Relè 1
EN60730-1	250V~	12 (2) A
UL 873		12A 5FLA 30LRA

Panel mounting: IP65



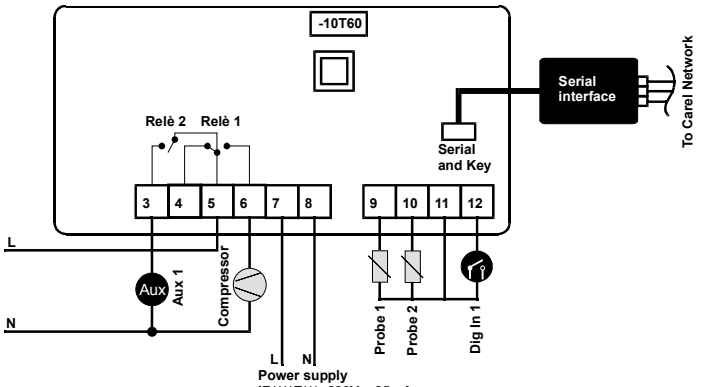
IR33S*EP*0
IR33S*EQ*0
IR33S*ES*0
IR33S*EU*0
IR33S*AP*0
IR33S*AQ*0
IR33S*AS*0
IR33S*AU*0

Preliminary version

		Relè 1	Relè 2
EN60730-1	250V~	12 (2) A	5 (1) A
UL 873		12A 5FLA 30LRA	5A 1FLA 6LRA

Maximum total current on terminal 5: 12A

Panel mounting: IP65

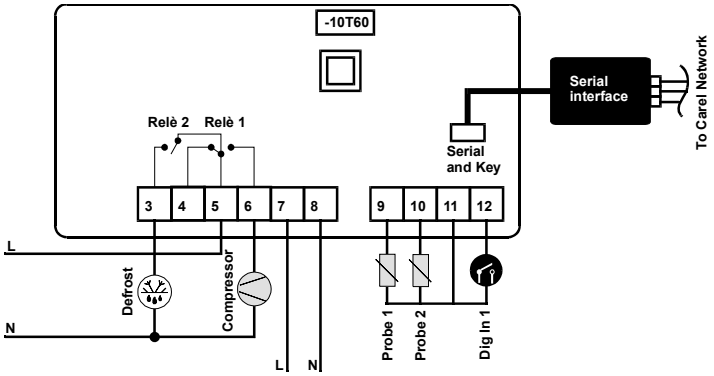


IR33S*EV*0
IR33S*EX*0
IR33S*EY*0
IR33S*EZ*0
IR33S*AV*0
IR33S*AX*0
IR33S*AY*0
IR33S*AZ*0

	Relè 1	Relè 2
EN60730-1 250V~	12 (2) A	5 (1) A
UL 873	12A 5FLA 30LRA	5A 1FLA 6LRA

Maximum total current on terminal 5: 12A

Panel mounting: IP65



IR33Y*EP*0
IR33Y*EQ*0
IR33Y*ES*0
IR33Y*EU*0
IR33Y*AP*0
IR33Y*AQ*0
IR33Y*AS*0
IR33Y*AU*0

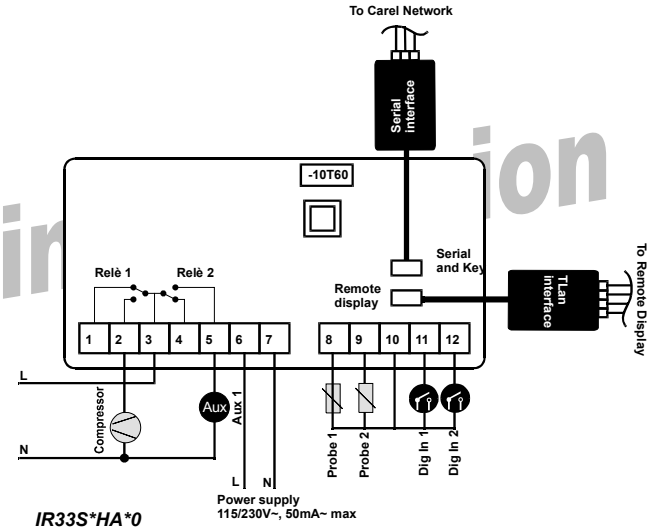
ir33 Connections: 115…230Vac switching versions

Preliminary version

	Relè 1	Relè 2
EN60730-1 250V~	12 (2) A	8 (4) A
UL 873	12A 5FLA 30LRA	8A 2FLA 12LRA

Maximum total current on terminal 3: 12A

Panel mounting: IP65

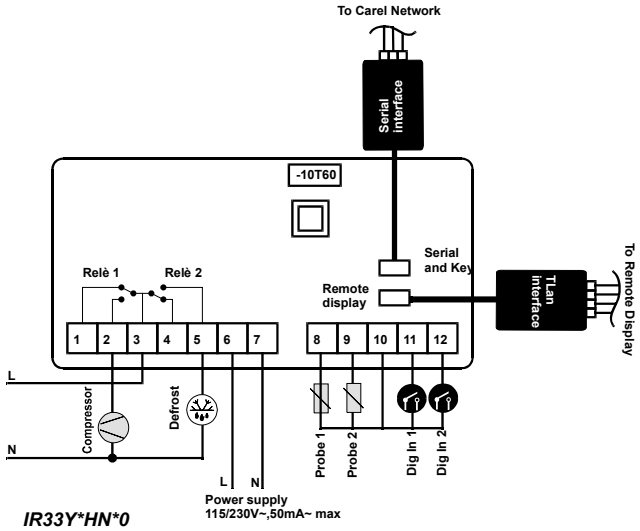


IR33S*HA*0
IR33S*HM*0
IR33S*HL*0
IR33S*HT*0

	Relè 1	Relè 2
EN60730-1 250V~	12 (2) A	8 (4) A
UL 873	12A 5FLA 30LRA	8A 2FLA 12LRA

Maximum total current on terminal 3: 12A

Panel mounting: IP65

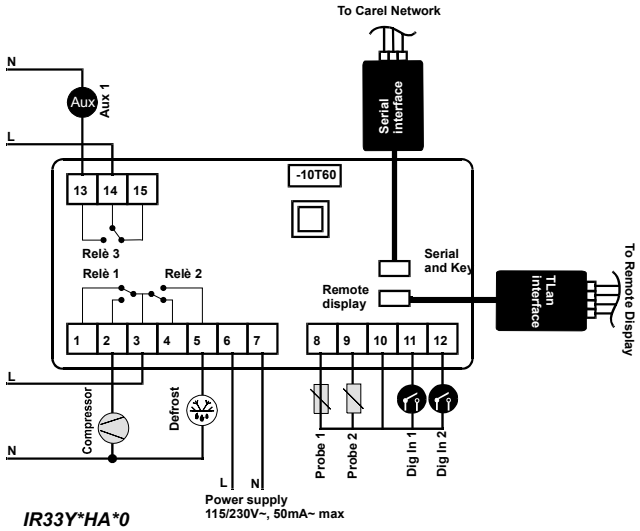


IR33Y*HN*0
IR33Y*HR*0
IR33Y*HC*0
IR33Y*HB*0

	Relè 1	Relè 2	Relè 3
EN60730-1 250V~	12 (2) A	8 (4) A	8 (4) A
UL 873	12A 5FLA 30LRA	8A 2FLA 12LRA	8A 2FLA 12LRA

Maximum total current on terminal 3: 12A

Panel mounting: IP65

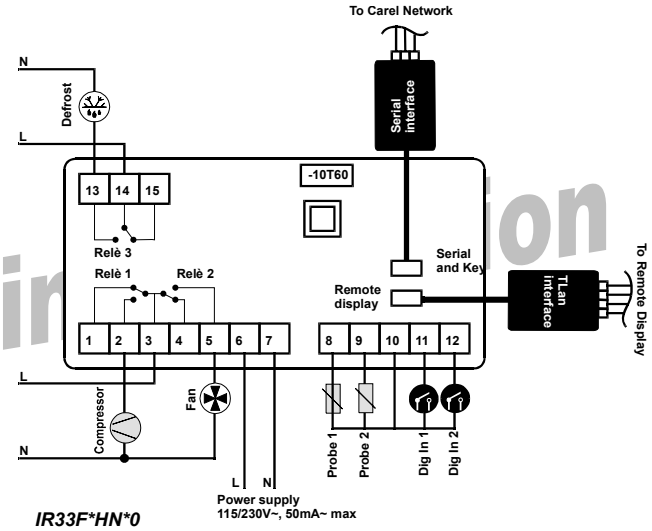


IR33Y*HA*0
IR33Y*HM*0
IR33Y*HL*0
IR33Y*HT*0

	Relè 1	Relè 2	Relè 3
EN60730-1 250V~	12 (2) A	8 (4) A	8 (4) A
UL 873	12A 5FLA 30LRA	8A 2FLA 12LRA	8A 2FLA 12LRA

Maximum total current on terminal 3: 12A

Panel mounting: IP65

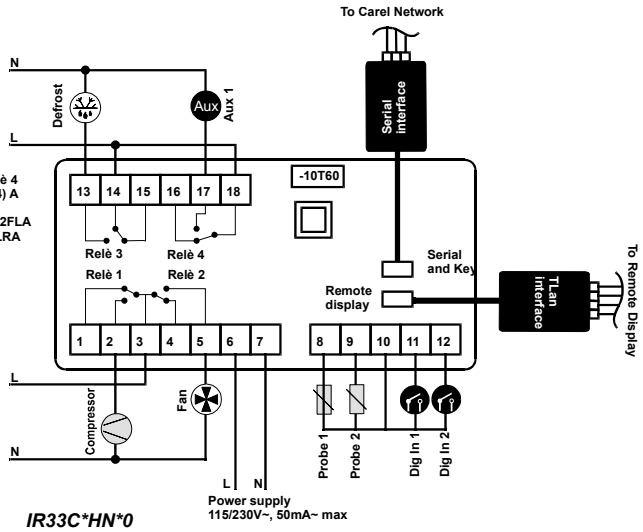


IR33F*HN*0
IR33F*HR*0
IR33F*HC*0
IR33F*HB*0

	Relè 1	Relè 2	Relè 3	Relè 4
EN60730-1 250V~	12 (2) A	8 (4) A	8 (4) A	8 (4) A
UL 873	12A 5FLA 30LRA	8A 2FLA 12LRA	8A 2FLA 12LRA	8A 2FLA 12LRA

Maximum total current on terminal 3: 12A

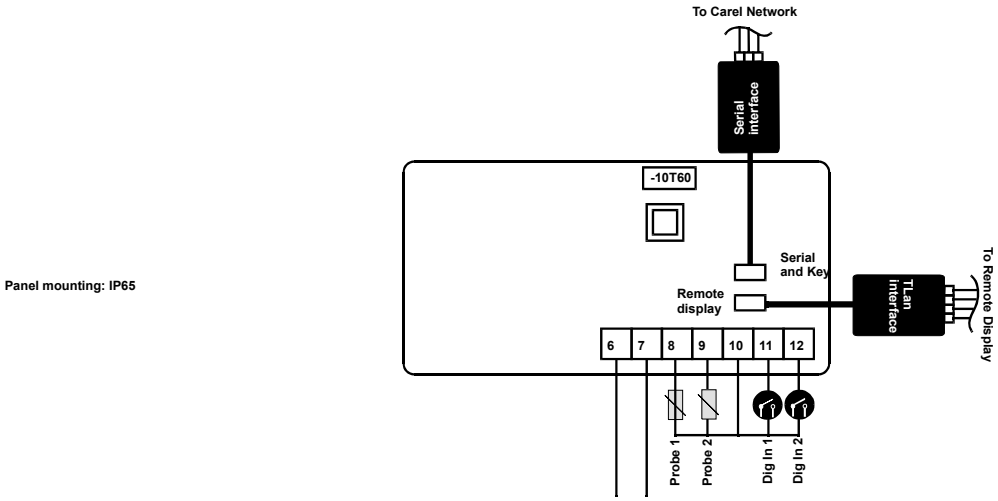
Panel mounting: IP65



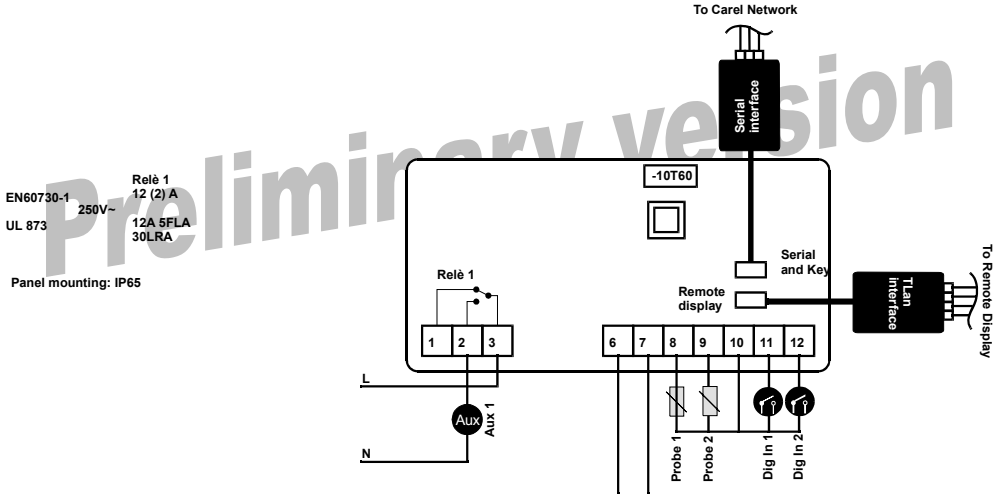
IR33C*HN*0
IR33C*HR*0
IR33C*HC*0
IR33C*HB*0

Preliminary version

Connessioni IR33: versioni switching 12Vac o 12…24Vac

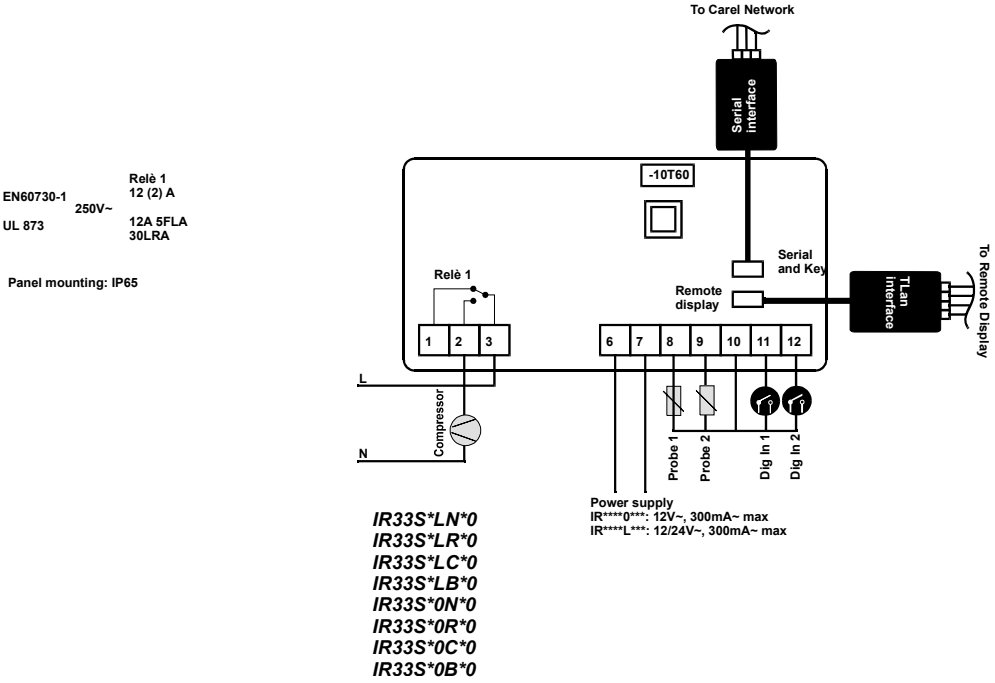


IR33M*LN*0
IR33M*LR*0
IR33M*LC*0
IR33M*LB*0
IR33M*0N*0
IR33M*0R*0
IR33M*0C*0
IR33M*0B*0



Preliminary version

IR33M*LA*0
IR33M*LM*0
IR33M*LL*0
IR33M*LT*0
IR33M*0A*0
IR33M*0M*0
IR33M*0L*0
IR33M*0T*0

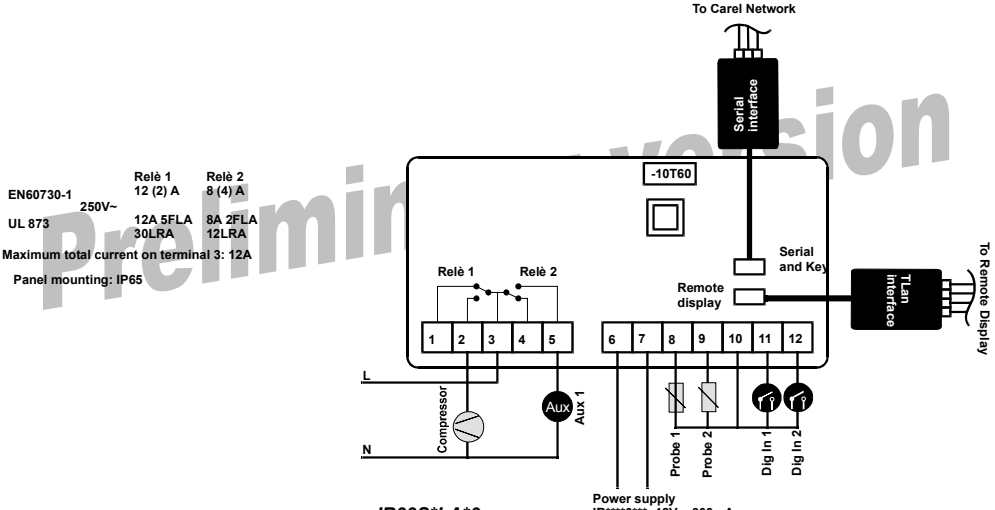


EN60730-1 250V~ Relè 1 12 (2) A

UL 873 12A 5FLA 30LRA

Panel mounting: IP65

IR33S*LN*0
IR33S*LR*0
IR33S*LC*0
IR33S*LB*0
IR33S*0N*0
IR33S*0R*0
IR33S*0C*0
IR33S*0B*0



EN60730-1 250V~ Relè 1 12 (2) A Relè 2 8 (4) A

UL 873 12A 5FLA 30LRA 8A 2FLA 12LRA

Maximum total current on terminal 3: 12A

Panel mounting: IP65

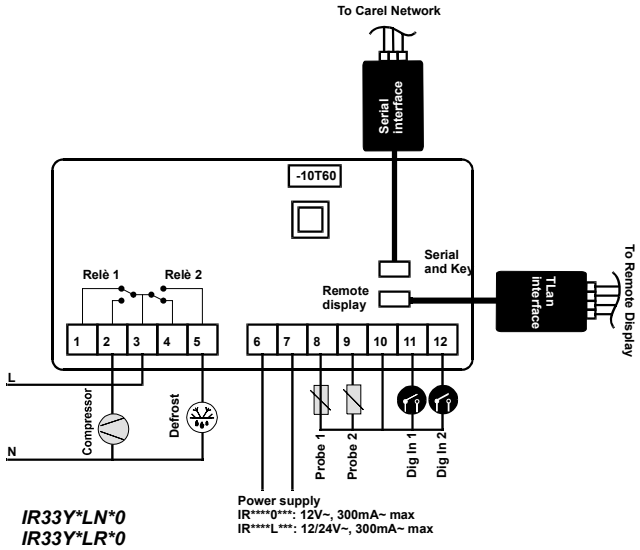
Preliminary version

IR33S*LA*0
IR33S*LM*0
IR33S*LL*0
IR33S*LT*0
IR33S*0A*0
IR33S*0M*0
IR33S*0L*0
IR33S*0T*0

		Relè 1	Relè 2
EN60730-1	250V~	12 (2) A	8 (4) A
UL 873		12A 5FLA 30LRA	8A 2FLA 12LRA

Maximum total current on terminal 3: 12A

Panel mounting: IP65



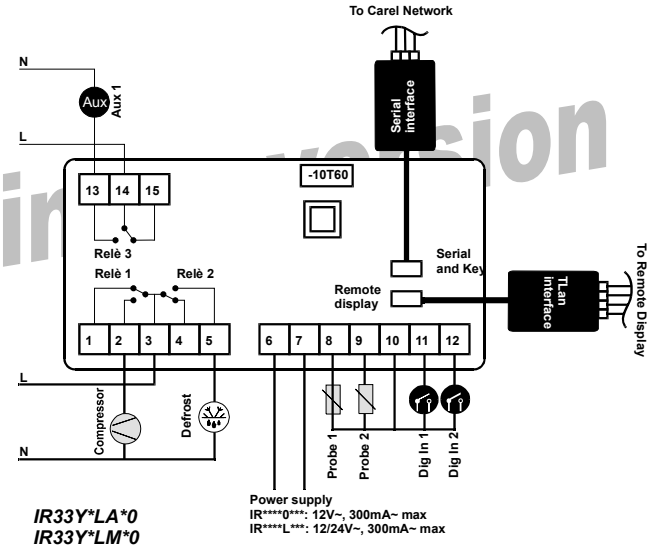
IR33Y*LN*0
IR33Y*LR*0
IR33Y*LC*0
IR33Y*LB*0
IR33Y*0N*0
IR33Y*0R*0
IR33Y*0C*0
IR33Y*0B*0

		Relè 1	Relè 2	Relè 3
EN60730-1	250V~	12 (2) A	8 (4) A	8 (4) A
UL 873		12A 5FLA 30LRA	8A 2FLA 12LRA	8A 2FLA 12LRA

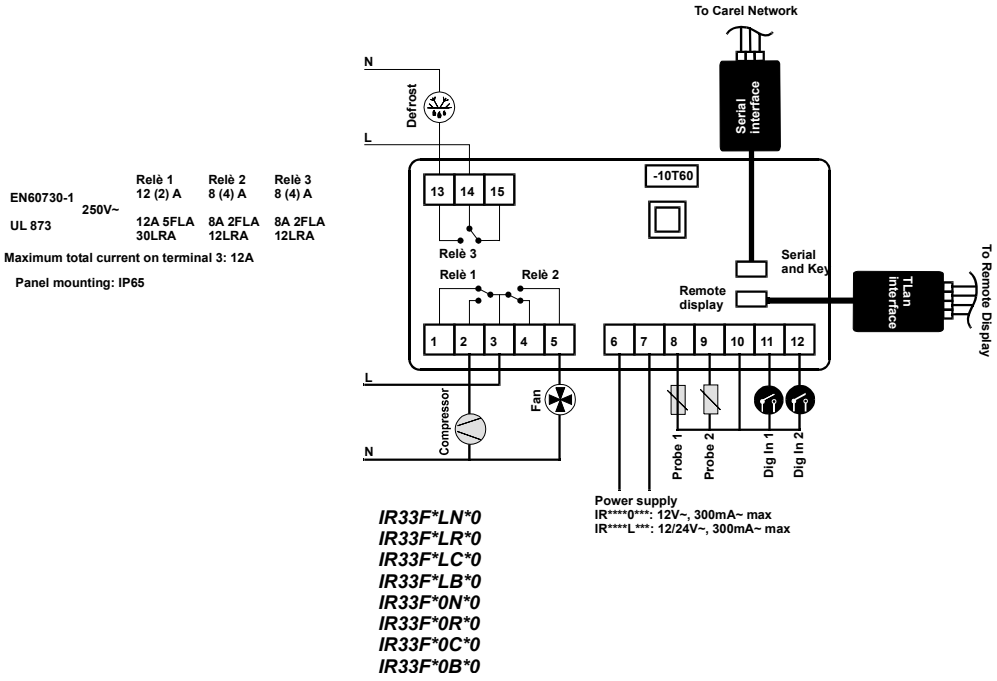
Maximum total current on terminal 3: 12A

Panel mounting: IP65

Preliminary version



IR33Y*LA*0
IR33Y*LM*0
IR33Y*LL*0
IR33Y*LT*0
IR33Y*0A*0
IR33Y*0M*0
IR33Y*0L*0
IR33Y*0T*0

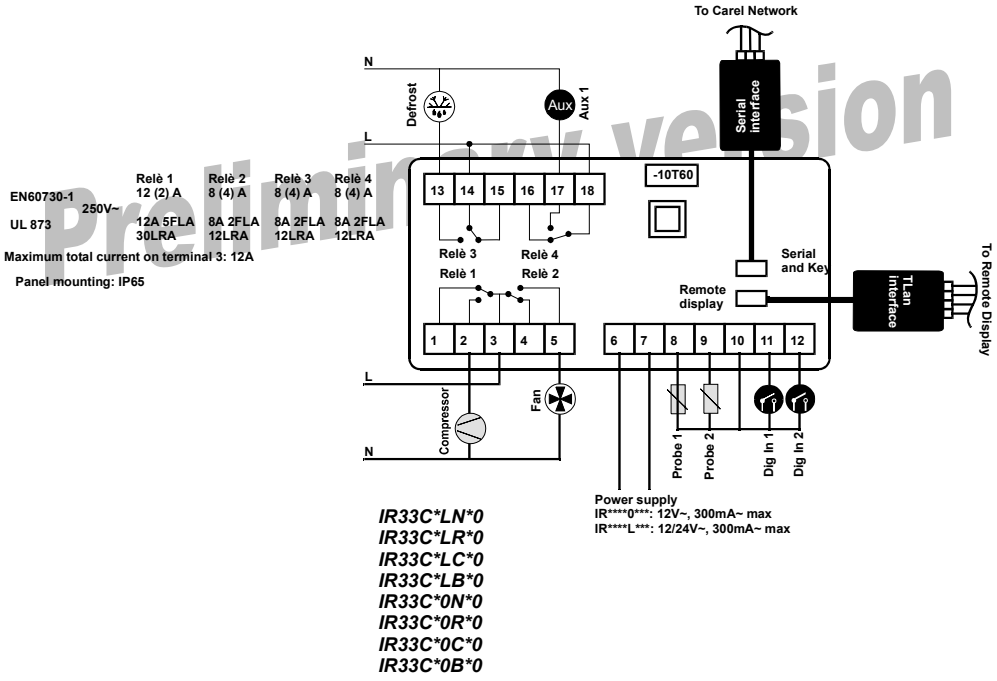


		Relè 1	Relè 2	Relè 3
EN60730-1	250V~	12 (2) A	8 (4) A	8 (4) A
UL 873		12A 5FLA 30LRA	8A 2FLA 12LRA	8A 2FLA 12LRA

Maximum total current on terminal 3: 12A

Panel mounting: IP65

IR33F*LN*0
IR33F*LR*0
IR33F*LC*0
IR33F*LB*0
IR33F*0N*0
IR33F*0R*0
IR33F*0C*0
IR33F*0B*0



		Relè 1	Relè 2	Relè 3	Relè 4
EN60730-1	250V~	12 (2) A	8 (4) A	8 (4) A	8 (4) A
UL 873		12A 5FLA 30LRA	8A 2FLA 12LRA	8A 2FLA 12LRA	8A 2FLA 12LRA

Maximum total current on terminal 3: 12A

Panel mounting: IP65

IR33C*LN*0
IR33C*LR*0
IR33C*LC*0
IR33C*LB*0
IR33C*0N*0
IR33C*0R*0
IR33C*0C*0
IR33C*0B*0

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Tecnologia ed Evoluzione

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Agenzia / *Agency:*

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